UNIVERSITY OF LIVERPOOL

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Maintaining Systemic Stability by Enhancing Information Disclosures in the Banking Industry

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BY

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Abstract

Information disclosure is crucial especially considering the functioning of market efficiency suggested by finance theories and the need of market regulation required by authorities. However, over a long period of time, financial institutions have held ambiguous attitudes towards the regulation of information disclosure such that financial institutions always seek the business environment with more economic freedom and less regulation of information disclosure. In particular, the banking industry is always an opaque sector in our economy even though the banking industry is always under strict scrutiny from authorities. Inappropriate regulation of the banking industry was blamed for the 2008 financial crisis which originated in the US, as poor information reporting and intended information makeup had fooled the market which resulted in the abrupt market turmoil in 2008.

Considering the profound meaning of information disclosure in finance and the significant role of the banking industry in our economy, this thesis investigates issues regarding information disclosure in the banking industry.

This research finds that the banking industry has positively responded to the call from the Basel Committee for the past two decades by enhancing banking information disclosures. Whilst, on average, there is a negative impact on stock price by the release of annual reports in the banking industry, which implies that the market generally views the information within the annual reports as bad news over this period. Moreover, the negative response to the annual report release demonstrates a time-lagged manner, which brings us more to think about market behaviours when processing complicated information and the definition of market efficiency. Investors in the market can treat this finding as a potential 'calendar effect' and manage their risks more carefully around the date of annual report release.

Two relationships are tested using the data of the banking industry, which are the relationship between market valuation and information disclosure and the relationship between stock return volatility and information disclosure. Contrary to the general finding in previous research which suggests that increased information disclosure is associated with higher market valuation, the empirical finding in the current research

indicates that increased information disclosure is associated with lower market valuation. The argument which states that increased information disclosure is helpful to boost market valuation probably omits the nature of the information (bad news or good news), and the banks in the studying period of the argument were filled with good news, which leads to a biased conclusion. Meanwhile, the empirical finding in the current research suggests that increased information disclosure is associated with lower stock return volatility, which provides additional evidence to the debatable issue whether increased information disclosure would mitigate stock return volatility.

Although, both the event study and the regression analysis have triggered doubts about the beneficial impact on market valuation by increased information disclosures, alongside the concerns of privacy and cost when disclosing information suggested by previous research, this research still firmly believes that the potential benefits of information disclosure would outweigh the disadvantages of information disclosure particularly considering the overall stability and safety of our economy. Maybe the statement by Faust and Svensson (2001) can be applied here that increased information disclosure in the banking industry is generally and socially beneficial but frequently bad for banks.

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Chapter 1

Introduction

1.1 Background

Information is crucial for the functioning of an efficient market, in which market participates can better make investment decisions and allocate capital resources by information transparency. From a regulation perspective, financial policymakers believe that information transparency will help to prevent systemic risk. Numerous financial regulations such as US GAAP[1] and IFRS[2] all require a high level of information disclosure in a hope to better safeguard the health and stability of business environment. However, over a long period of time, financial institutions have held ambiguous attitudes towards the regulation of information disclosure that financial institutions always seek the business environment with more economic freedom and less regulation of information disclosure.

In particular, the banking industry is always an opaque sector in our economy even though the banking industry is always under strict scrutiny from authorities. Inappropriate regulation of the banking industry is blamed for the 2008 financial crisis which originated in the US. Poor information reporting and intended information makeup have fooled the market which results in the abrupt market turmoil in 2008

[1] Generally Accepted Accounting Principles, also called US GAAP or GAAP, are the generally accepted accounting principles adopted by the U.S. Securities and Exchange Commission (SEC).
[2] International Financial Reporting Standards (IFRS Standards) is a single set of accounting standards, which is developed and maintained by the International Accounting Standards Board with the intention to be applied globally. IFRS advocates the disclosure of high quality and reliable financial information in capital markets.

(Barth and Landsman, 2010). However, this is not the first time the importance of information transparency has been emphasised in preventing systemic risk that history just repeats itself, Vishwanath and Kaufmann (2001) point out that the Asian financial crisis in the late 1990s was the consequence of information opacity and advocate that information disclosure in the financial market should possess desirable characteristics: access, timeliness, relevance, and quality. Financial regulators should take information transparency into account when viewing issues about macroeconomic policy and economic development, which means that financial regulators should promote information transparency by implementing incentives for disclosure and establishing regulations to minimize perverse incentives. Bertomeu and Magee (2011) find that the quality of information disclosure is interlinked with the economic cycle. As the economy moves downward from good times, banks move from good quality in information disclosure to bad quality in information disclosure, in which the pressure of this shift in the quality of information disclosure originates from bad loans and interest rates. Under recession periods, banks are likely to conserve information about the condition of their existing loans, those with bad loans will most likely decrease the quality of information disclosure so that they may hide their poor financial status. The larger amounts of bad loans, the less likely a bank will maintain high quality in information disclosure. On the other hand, those banks with good loans will maintain high quality in information disclosure so that they may demonstrate their strong financial status. Fortunately, it seems that the Basel Committee[3] senses the potential

[3] The Basel Committee on Banking Supervision provides a forum for central banks around the world addressing banking supervisory matters. The Basel Committee maintains its secretariat in Basel, Switzerland, and the committee normally meets there. The objective of the Basel Committee is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. The Committee's members come from Argentina, Australia, Belgium, Brazil, Canada, China, European Union, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Further information can be traced through https://www.bis.org/bcbs/.

problem of this inconsistent voluntary disclosure by providing the Basel Accord[4] which requires banks to mandatorily disclose certain risk information in order to prevent systemic risk.

Besides this subtle relationship between economic health and information disclosure, other issues surrounding information disclosure have also attracted attention in the research of finance. Elliott and Jacobson (1994) argue that some parties might benefit from information disclosures, some parties might suffer from information disclosures, and others might be affected by both the benefits and costs of information disclosures. For example, the cost of information disclosure is borne by companies, but the companies might be also beneficiaries of the information disclosure they paid for. In addition, we should be aware that sometimes information disclosure is immaterial in cost which means that it is hard to measure the economic utility of information disclosure. The types of costs and benefits in information disclosure could be economic, political, social, and ethical. Yosha (1995) raises a concern about the privacy issue when a company discloses information to the market, as company competitors could take advantage of the disclosed information. Hope (2003) finds that firm-level information disclosure is positively related to forecasting accuracy, which implies that information disclosure provides useful material to analyst evaluation. Moreover, strong enforcement is associated with higher information disclosure, since enforcement encourages company managers to follow prescribed accounting standards, which in turn reduces analysts' uncertainty about future company earnings. Eng and Mak (2003) find that increased information disclosure is associated with lower

[4] The Basel Accord is a set of information disclosure standards proposed by the Basel Committee in order to improve the quality and quantity of information disclosures in the banking industry and to prevent systemic risk in our economy. Till present, the Basel Accord I and Basel Accord II have been formulated and promoted to the world, and the updated Basel Accord III is expected to be available by the end of 2019.

managerial ownership, and larger firms and firms with lower debt have greater information disclosure. Bushee and Leuz (2005) examine the economic consequences of a regulatory change mandating firms to comply with reporting requirements under the 1934 Securities Exchange Act[5], and find that the imposition of disclosure requirements leads to significant costs for smaller firms. However, the imposition of disclosure requirements has also significant benefits that the firms complied with the 1934 Securities Exchange act have experienced positive stock returns and permanent increases in liquidity, indicating positive externalities from disclosure regulation and reduced information asymmetry. Bertrand and Morse (2011) find that information disclosure makes people think less narrowly and consider the long-term effect on finance costs, which leads to less loan-borrowing. Hermalin and Weisbach (2012) show that greater information disclosure tends to raise CEO compensation and can create additional or exacerbate existing agency problems. Therefore, even ignoring the direct costs of information disclosure (e.g., meeting stricter accounting standards, maintaining better records), there could be external costs of information disclosure. On the opposite of Hermalin and Weisbach (2012), the research conducted by Armstrong et al. (2012) suggests that information disclosure serves as an important substitute for governance mechanism and is particularly helpful in mitigating agency problems. Dhaliwal et al. (2014) find a negative association between the disclosure of financial and corporate social responsibility (CSR) information and the cost of equity capital, in which this negative relationship is more pronounced in stakeholder-oriented countries. Luo et al. (2014) demonstrate that security analysts observe corporate social performance and take it into consideration when recommending stocks to general investors. In particular, as corporate social performance is often ambiguous and

[5] The 1934 Securities Exchange Act was created to govern securities transactions on the secondary market, in a purpose of ensuring greater financial transparency and less financial fraud.

uncertain to general investors, security analysts may serve as an informational pathway connecting companies to general investors. Therefore, the observation by security analysts provides additional information to general investors and affects the stock performance of a company. Martínez-Ferrero et al. (2015) observe that the information disclosure in corporate social responsibility (CSR) has increased in recent years. This increase has pushed companies to set aside the classic economic view and to comprehensively report social, environmental, and financial information in order to satisfy the needs of their stakeholders. Companies that provide high-quality financial information tend to be more conservative in reporting their earnings and less inclined to carry out unethical practices such as earnings manipulation. Accordingly, companies that provide high-quality financial information are more socially responsible.

It is clearly impossible to list all relevant issues surrounding information disclosure, as the wide range of issues surrounding information disclosure are complex and enormous and the research field of information disclosure in finance is constantly extending new horizons.

1.2 Motivations and Research Objectives

Considering the profound meaning of information disclosure in finance and the significant role of the banking industry in the economy, this research decides to investigate issues regarding information disclosure in the banking industry.

First, this research intends to investigate the general impact of information disclosure on the banking industry. As the annual report is the most important means to communicate company performance and governance to the market, this research decides to employ the annual report as the proxy of information disclosure. Event study

will be conducted to test the impact of annual report disclosure on stock price. Through this process, this research can also test market efficiency by seeing how quickly the market responds to the annual report disclosure.

Second, as inappropriate information disclosure is an underlying reason for financial crisis (Vishwanath and Kaufmann, 2001; Barth and Landsman, 2010) and the call from the Basel Committee for the disclosure of regulated risk information in preventing financial crisis, this research decides to investigate issues regarding the disclosure of risk information in the banking industry. A picture depicting the disclosure status of risk information will be drawn in order to see whether the banking industry has responded to the urge from the Basel Committee by increasing the disclosure of risk information.

Third, this research intends to test whether the change of risk information disclosure has any impacts on these banks. Market valuation is clearly an important concern for every company that every company wants to be favourably valued by the market, hence one testing perspective will be the impact of risk information disclosure on market valuation. Together with the impact of general information disclosure on stock price conducted by the event study previously, this research wants to provide some empirical evidence regarding the impacts of information disclosures on company valuation. By doing so, this research might explain if there are any underlying reasons that a bank tends to hide information by avoiding tighter regulations of information disclosure.

Fourth, as financial crisis always comes along with severe market volatility, this research intends to test whether the change of risk information disclosure has any impact on market volatility, which will provide indirect evidence for whether enhanced

risk information disclosure would prevent systemic risk suggested by the Basel Committee.

1.3 Thesis Structure

This thesis proceeds as follows. Chapter 2 unveils the thesis by introducing the 'handbook' of banking information disclosure – the Basel Accord and the significant role of banking information disclosure in maintaining systemic stability for our economy. Chapter 3 tests the general impact of banking information disclosure on stock price by using the method of event study. Chapter 4 narrows down the research scope by drawing a picture depicting the status of risk information disclosures in the banking industry over the past two decades. Chapter 5 investigates the relationship between risk information disclosures and market valuation in the banking industry, which aims to find what kind of impacts the change of risk information disclosure will have on market valuation. Chapter 6 investigates the relationship between risk information disclosures and market volatility in the banking industry, which aims to find what kind of impacts the change of risk information disclosure will have on market volatility. Finally, chapter 7 summarises the whole thesis by providing implications for policymakers and indicating directions for future research.

In terms of research purpose, chapter 3 will target our first research objective, chapter 4 will target our second research objective, chapter 5 will target our third research objective, and chapter 6 will target our fourth research objective.

Chapter 2

The Call from the Basel Committee to Increase Banking Information Disclosure

2.1 Introduction

The banking industry is important for our economy, therefore financial regulators implement a tight control over the banking industry to avoid financial turmoil. One requirement for banks is to maintain a certain degree of information disclosure. Financial regulators believe that the safety of the banking industry is based upon its information transparency. Although financial regulators around the world have not achieved a common platform in guiding the banking information disclosure, more and more countries have paid attention to the Basel Accord which specifies information disclosure particularly in the aspect of risk information for the banking industry.

This chapter provides a broad context for this research by pointing out the importance of banking information disclosure. Section two briefly discusses the importance of the banking industry. Section three introduces the guidance of banking information disclosure – the Basel Accord and the development of the Basel Accord. Through the suggestion by the Basel Committee and the relevant literature of banking information disclosure, section four reveals the principal purpose of information transparency in the banking industry - maintaining systemic stability. Section five pays attention to the potential concerns of banking information disclosure. Section six takes a look at the

status of the recent banking information disclosures. While section seven summarises this chapter in the end.

2.2 The Importance of the Banking Industry

The banking industry is, without a doubt, one of the most important sectors in any economy. ING Group[6] suggests that banks have three basic functions: 1. Being responsible for the payment system. Since the world is in a digital era and people use less cash during transactions, electronic payments like card payments, online payments, transfers, etc. are becoming more popular and important. Banks are in charge of the smoothness and security of these transactions. 2. Storing savings for people. Banks are where people can safely deposit their savings, which banks then pay interest on. If there were no banks, people would have to store and protect their savings themselves, which would involve a lot of hassles and risks. 3. Financing the needs of daily life for people and the needs of business development for companies by issuing loans to them. Without loans from banks, it would be very hard for people to buy a house, or for companies to develop their business plans. Besides these three basic functions, the modern banking industry extends its business to a variety of other things, such as asset management for people and companies, with a lot of investment banks specializing in this area. This can range from gaining access to capital for growth and investments, to assisting in mergers and acquisitions, to converting currencies. Our economy could not function without the existence of the banking industry, and banks are the oil for the wheels that keep the economy turning.

[6] The ING Group is a Dutch international banking and financial servicing corporation headquartered in Amsterdam. The detailed information regarding the banking function suggested by the ING Group can be traced through https://www.ing.com/About-us/Profile-Fast-facts/The-role-of-banks.htm.

2.3 Basel Accords – One of the Banking Information Disclosure Handbooks

To protect the safety and security of the financial system, a range of international organizations – the Basel Committee, G8 Finance Groups, the International Monetary Fund and the World Bank are constantly developing guidelines to help central banks around the world to regulate their own banking industries. One of the most influential organizations is the Basel Committee, and one of the most influential banking supervision principles is the Basel Accord proposed by the Basel Committee. The Basel Committee is based in Basel, Switzerland, thus titled the name of the committee with its located city. There were only 10 members[7] when the Basel Committee was initially established in 1974. The member number of the Basel Committee has gradually increased after that, and nowadays there are 27 members[8] in the Basel Committee.

The Basel Accord is a comprehensive handbook that guides banks to release crucial information to the public. Before the appearance of the Basel Accord, there were more than eight banking regulation standards spread around the world. After the release of the Basel Accord I in 1988, the Basel framework has steadily become popular as a common approach for banking regulation in the world.

In 1988, the Basel Committee put forward the first regulation standard the Basel Accord I, which details the guideline to set up the capital requirement according to

[7] The 10 members are Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, the United Kingdom and the United States.
[8] The 27 members are Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

bank's credit risk. Following the Basel Accord I, the Basel Committee introduced the Basel Accord II[9] in 2004. This deepened the regulation standard by looking out not only the capital requirement about bank's credit risk but also the capital requirements about bank's operational and market risks. Basel II has three pillars to strengthen its existence: The first pillar deals with the capital requirements of credit risk, operational risk and market risk. The core idea of the first pillar is that the greater the risk a bank takes, the more risk-weighted capital the bank should maintain. The second pillar addresses the credit risk, operational risk and market risk in more detailed sub-categories such as pension risk, strategic risk, reputational risk and legal risk. The third pillar is a complimentary pillar for the previous two pillars and designed as a framework for banking regulators to execute regulations over the banking industry in a detailed manner. Basel II was intended to replace Basel I by upgrading the banking regulations. Following the 2008 financial crisis, however, the effectiveness of Basel II has been doubted. In order to modify the perceived deficiencies of Basel II, the Basel Accord III is planned to replace Basel II in 2019. The updated feature of Basel III is to further strengthen capital requirements by increasing liquidity and decreasing leverage in the banking industry.

2.4 Maintaining Systemic Stability: The Principal Purpose of Banking Information Disclosure

Before the 1980s, there used to exist a trend of loose control over the market. However, as the banking industry thrived by the emergence of newly designed financial products and innovative financial instruments, this lose control brought up financial turmoil in

[9] The Basel Accord II was firstly proposed by the Basel committee in 1999 and the refined Basel Accord II was released in 2004 with enhanced information disclosure requirements.

a number of countries in the late 1980s and early 1990s. The introduction of the Basel Accord I aimed to control this kind of financial turmoil derived from the banking industry. The core value of the Basel Accord is to make the banking information more transparent to the public, with a hope of bringing safety and stability to our financial system.

Why do we need a global standard such as the Basel Accord to guide banks to release information properly in order to achieve safety and stability in our financial system? The Basel Committee believes that there are mainly two answers for this question: First, the banking system is very complex and fragile. If different countries use different banking regulation standards, it would make the complex and fragile banking system even more complex and fragile. It is hard to figure out the real risk by comparing the information of incompatible reporting systems. A lot of loopholes would emerge from the gaps between different reporting systems. By adopting a standardised common framework such as the Basel Accord, the contents of information in the banking disclosure will be comparable across different countries and over different periods. Second, the banking system is very crucial for society. Tchana (2008) also states that the banking system is too important to fail, hence society should prevent banking crises from happening at all costs. The report of Basel Committee (1998) -- 'Enhancing Bank Transparency' encourages a single, standard and comprehensive information disclosure by banks around the world. The report believes that the transparency of banking information is so important that the underlying market discipline should be enforced by financial regulators in such a way as to reward those banks managing risks effectively and penalise those disclosing imprudent information. The report addresses the issue of banking information disclosure from six categories: financial performance, financial position (capital

requirement, solvency, and liquidity), risk management strategy, risk exposure, accounting policy, and business governance. The reporting quality of these six categories should follow the characteristics of comprehensiveness, relevance, timeliness, reliability, comparability and materiality, and financial regulators around the world should always take these characteristics into account when implementing policies.

Boro (1986) believes that the most crucial point of establishing a transparency regime in the banking industry is to ensure its safety and stability. A mandatory disclosure requirement in the US initially designed for retail banks has proved efficient in preventing the big losses of the American banking industry in the 1970s. The risk of over-withdrawals was the major challenge faced by the retail banks in the US at that time. After the improvement of information disclosure, depositors felt safer about their asset placements in banks, and the cases of large over-withdrawals had decreased. In addition, Boro (1986) suggests that the US Federal Reserve could use the disclosed information to better control the banking risk by charging a higher default rate from the banks taking extra risks. The banks that have been charged a higher default rate would be less likely to take additional risks. The US Federal Reserve could also use the disclosed information to better implement policies.

Higher stock return volatility is associated with higher market risk. Baumann and Nier (2004) find that the information transparency level is negatively related to the stock return volatility by testing a sample of 600 banks in 31 countries over the period 1993-2000. The transparency level is measured through three indices, and each of the three indices is a self-sufficient measurement of information transparency: the first one is an index composited by the Center for International Financial Analysis Research (CIFAR) which measures the information transparency level for all industries globally in the

1990s; the second index is a dummy variable which identifies whether a bank is listed on the US stock market; the third index is designed by Baumann and Nier (2004) which contains items which may affect stock return volatility including loans by maturity, loans by type, loans by counterparty, problem loans, problem loans by type, securities by type, securities by holding purpose, deposits by maturity, deposits by type of customer, money market funding, long-term funding, reserves, capital, contingent liabilities, off-balance sheet items, non-interest income and loan loss provisions. Each of the three indices is individually regressed with additional control variables to test the relationship between stock return volatility and information disclosure. Baumann and Nier (2004) employ the ordinary least squares (OLS) regression to obtain the results, and the results show that in general each of the three indices is significantly and negatively related to the stock return volatility. That is to say, a higher level of information disclosure is associated with a lower level of stock return volatility. A more specific regression analysis is conducted in order to further test the disclosure impacts of individual items. For the individual items composing the third index, information disclosures about securities by type, securities by holding period, deposits by type of customer, long-term funding, contingent liabilities, off-balance sheet items and non-interest income are all associated with reduced levels of stock return volatility.

Barth et al. (2004) demonstrate that increased information disclosure is helpful to mitigate systemic risk by drawing on their new database on bank regulation and supervision in 107 countries among the years of 1998, 1999 and 2000. First, Barth et al. (2004) assess two competing theories of government regulation: the helping-hand approach and the grabbing-hand approach. The helping-hand approach refers to the government regulation by correcting market failures, and the grabbing-hand approach refers to the government regulation by supporting political constituencies. Second,

Barth et al. (2004) assess the relationship between the regulatory and supervisory policies and the development and fragility of the banking industry. The results suggest that the grabbing-hand approach is more effective in preventing systemic risk by providing effective regulatory and supervisory practices. The effective regulatory and supervisory practices are those that force accurate information disclosure, empower private sector monitoring of banks, and foster incentives for private agents to exert corporate control.

Nier (2005) investigates the potential trade-off of information disclosure by examining a large sample of banks globally during the period 1994-2000, whether information transparency increases or decreases the chance of severe banking problems. Through the regression analysis by controlling other bank variables, the empirical results suggest that the banks disclosing more information are less likely at the risk of falling into crisis, in which large changes in banks' stock prices are used as the indicator of financial crisis and a disclosure index covering 17 dimensions of accounting information is used as the indicator of information transparency. This result implies that information transparency is able to bring major dividends for overall financial stability and reduce the incidence of the banking crisis.

By looking through capital buffers against portfolio risk derived from adverse selection, Nier and Baumann (2006) find that the information disclosure disciplined by the government is effective in limiting the risk of bankruptcy in the banking industry. Additionally, the bank itself will be more morally responsible when issuing loans to borrowers, in which the careful loan generating process mitigates the potential risk from adverse selection caused by borrowers. This empirical research is based on a large cross-country panel data with observations of 729 individual banks from 32 different countries over the years 1993 to 2000.

Cuoco and Liu (2006) study the behaviour of a financial institution if there is a VaR[10] reporting from the institution. A higher capital requirement will be enforced by financial regulators if a financial institution reports a higher VaR. Thus, the capital requirement subject to its reported VaR is a good cushion for buffering the risk faced by a financial institution. Cuoco and Liu (2006) suggest that the capital requirements related to VaR and the associated back-testing are an effective way to curb the market risk in the banking industry, and a plausible approach to reveal the potential risk of individual banks.

Tadesse (2006) investigates the relationship between banking information transparency and systemic stability, and the relationship between systemic stability and the stringent degree of regulatory regimes. Tadesse (2006) finds that both of these two relationships are positive. That is to say, the more transparent a banking system is, the less likely a country will suffer from a financial crisis; and the more stringent the regulatory regime a country has, the less likely a country will suffer from a financial crisis. The most important four characteristics that will help to prevent financial crisis are: 1) comprehensive disclosure procedure; 2) timing financial control; 3) informative reporting system; 4) credible information disclosure.

Hirtle (2007) tests the relationship between the amount of information disclosed by US banks and their subsequent stock return volatility. Using the data extracted from the annual reports of these banks, an index is composited for measuring the market risk information disclosure of these banks. The regression analysis conducted by Hirtle (2007) shows that a higher level of information disclosure is associated with a lower

[10] The Value-at-Risk methodology (VaR) is a forward-looking way to measure market risk, which states the probability of losing a certain amount of money on an investment over a given time period. This thesis will give a comprehensive description of the VaR method in chapter 4.

level of stock return volatility, and in turn with a higher risk-adjusted return. These findings also suggest that enhanced information disclosure is associated with more efficient risk taking and thus improved risk-return trade-offs, although the direction of causation is unclear.

Ahrend et al. (2011) investigate whether banking systems in countries with more stringent prudential information reporting have proved more stable during the recent financial crisis. Ahrend et al. (2011) find that the stringent level of information reporting is positively correlated with the extent to which countries have escaped damage during the recent financial crisis, as measured either by the degree of equity value destruction in the banking industry or by the fiscal cost of financial sector rescue. This empirical result suggests that the banking system in countries with enhanced information reporting were less affected by the recent financial crisis. Although numerous factors have influenced the impact of the financial crisis in a given country, the findings provide evidence that even in a world where a country may not be able to fully insulate from the global financial crisis, its system of prudential information reporting can still be important in mitigating the impact of the financial crisis.

The stability of the banking industry depends on the stability of its deposit status, Wu and Bowe (2012) investigate the relationship between information disclosure and depositor behaviour in the Chinese banking sector. In particular, Wu and Bowe (2012) enquire whether enhanced information disclosure enables investors to more effectively assess a bank's risk profile, thereby influencing their deposit decisions. By utilizing the unbalanced panel data incorporating 169 Chinese banks over the period of 1998–2009 and employing the generalised-method-of-moments (GMM) estimation, Wu and Bowe (2012) find that: (i) the growth rate of deposits is sensitive to bank fundamentals after controlling for macroeconomic factors, diversity in ownership structure, and

government intervention; (ii) the more information transparency of a bank, the more likely the bank will experience growth in its deposit base; and (iii) the more information transparency of a bank, the more likely the bank will offer loans with higher interest rates.

Sowerbutts et al. (2013) argue that inadequate public disclosure by banks has contributed to the financial crisis. This is because those investors are unable to judge the risks which banks are bearing in times of systemic stress, which leads to over-withdrawals. Sowerbutts et al. (2013) advocate that policymakers should continue encouraging the banking industry to enhance information disclosure, which should help reduce excessive risk-taking by banks and lead to positive outcomes for financial stability.

2.5 Major Concerns of Banking Information Disclosure

2.5.1 Costs Arising from Information Disclosure

The theoretical discussion by Shaffer (1995) states that mandatory information disclosure is very costly in practice and whether the benefit is over the cost of doing so is doubtful. Some companies voluntarily disclose their inside information in a hope to attract more investors and reduce the cost of capital, as these companies believe that investors like to invest in the company with a comprehensive information disclosure and will require a higher risk premium if a company is in an opaque status. However, once a certain amount of information is disclosed, additional information will be redundant. In this kind of situation, the net benefit of mandatory information disclosure is negative since the market has already grasped sufficient information. Policymakers should analyse the scenarios from case to case when implementing the mandatory

disclosure policies and monitor the outcomes of the mandatory disclosure policies periodically.

Admati and Pfleiderer (2000) point out that the cost of providing information is undertaken by individual banks, and the benefit of using information might be enjoyed by markets instead. Through the economic perspective, it is hard to figure out whether the overall benefit of providing information will outweigh the overall cost of assimilating information, since the principal party of providing information is different from the principal party of receiving information and there exists certain tracing difficulties of the benefit and cost of information disclosure.

Hyytinen and Takalo (2002) assert that in order to achieve the status of comprehensive information transparency, banks should provide information on various sections including financial performance, liquidity, risk management, general strategy, etc. which is a complex and daunting task. Information disclosure will be very expensive especially when information disclosure becomes a routine procedure with constant information updating, as the regular routine of information disclosure will ask human resource department, internal system department, IT department, financial department and other crucial departments to co-ordinately work together. Implementing strict information transparency policy is unnecessary for small banks, because the bankruptcy of these small banks will not have a strong power to tumble down the whole financial system and the extensive information disclosure will be a substantial cost affecting the profit of these small banks.

2.5.2 Privacy Breach by Information Disclosure

Privacy is another concern derived from banking information disclosure. Linsley and Shrives (2005) argue that the private interest is not coincided with the public interest

at all times. The confidentiality of bank clients' information will not be thoroughly maintained in the banking industry and certain rights of bank clients will be violated if the authority has the same right to know all the information. The account between the privacy of bank clients and the safety of the financial system is a hard task to balance off. The bank itself also has technologies and safety issues which are not suitable to disclose. In addition, improving information disclosure may affect banks' plans and core interests, since its competitors could take advantage of sensitive information disclosure. The monitoring threat from bank's competitors prevents a bank from broadening new services and finding new opportunities. Therefore, a strict request of information transparency will be an obstacle for financial innovation.

2.6 Past Banking Disclosure Practices

Despite the release of the Basel Accord I in 1988 and the call for enhanced information disclosure of the banking industry from the Basel Committee, a lack of information disclosure is still prevalent in the banking industry. It seems that there are still different levels of regulation enforcements around the world and there are still many countries that adopt an inactive attitude towards information disclosure in the banking industry. The Group of Ten (G-10)[11] tried to enforce the Basel Accord I into a lawful regulation in 1992, but there were inconsistent opinions among these countries towards this proposal.

The Basel Committee conducted surveys in the years of 1998, 1999 and 2001 for the status of information disclosure among banks across the globe. The information disclosure levels among banks had slightly risen over the period 1998-2001 across the

[11] The Group of Ten (G-10) includes the countries: Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, the United Kingdom and the United States.

globe. However, when compared to the requirement of the Basel Accord I, this information disclosure level is still very low. These surveys also show that banks tend to provide backward-looking information instead of forward-looking information. The Basel Committee (1998, 1999 and 2001) suspect that there are two reasons for this: one is that banks were fearful of providing incorrect forecasting information which could be criticized by markets later; the other one is that banks were fearful of the potential use of the forward-looking information by their competitors.

Baumann and Nier (2003) find that the disclosure status of financial and accounting information for 600 banks around the world during the period 1993-2000 is varied not only from country to country but also within countries.

By visiting banks' websites during the first two weeks of 2006, Bonson-Ponte et al. (2006) compare the online information disclosure by principal European banks with the information disclosure required by the Basel Accord II, and find that on average the online information disclosure by these European banks has contained only thirty percent of the required information disclosure by the Basel Accord II. While the disclosure level of larger banks in Europe is thirty-seven percent which is higher than the average level. However, the variation of online information disclosure among European banks is huge even among those large European banks. Some banks in Europe only use their websites as an advertisement tool or a virtual shop. Bonson-Ponte et al. (2006) believe that the different disclosure levels among these banks would raise a new competitive era and differentiate these banks' attraction to investors, and suggest that the Basel Accord II should be put into a compulsory practice in the near future.

Helbok and Wagner (2006) take a look at the operational risk information disclosure in the banking industry around the world from 1998 to 2001. During the period of 1998-2001, the disclosure of operational risk information was only suggested by the Basel Committee as a voluntary practice instead of a mandatory task. However, the finding by Helbok and Wagner (2006) suggests that, even in this voluntary period (1998-2001), both the extent and content of operational risk information disclosure in the banking industry had increased significantly. Since the voluntary information disclosure within the period 1998-2001 had experienced a large degree of freedom, Helbok and Wagner (2006) wish the emergence of the Basel Accord II in 2004 could possibly bring uniformity and comparability for the information disclosure in the banking industry.

Hirtle (2007) shows that the information disclosure among banks in the US had increased between 1994 and 2004. The most significant increase of information disclosure is market risk information, which is likely caused by the law amendment in the US. The amended law asks US banks to mandatorily disclose certain market risk information and also encourages US banks to use the Value-at-Risk (VaR) method for measuring market risk. Meanwhile, it is a debatable issue whether the VaR method is prudent in reporting the risk faced by banks. Through the approach of econometric theory, Lucas (2001) evaluates the VaR method in conjunction with the proposed back-testing procedure. Lucas (2001) finds that the VaR has understated the risk faced by banks and suggests that banking regulators should modify the VaR method. On the other hand, through the approach of empirical study, Pérignon et al. (2008) find that the risk has been overstated by banks in Canada when adopting the VaR method, which means Canadian banks are overcautious about their market risks.

Oliveira et al. (2011) examine the risk-related reporting practices of 190 Portuguese banks based on a content analysis of banks' 2006 annual reports. Risk-related disclosures within these banks are found to be incomparable, because there were different maturity time bands of exposures to credit, market and liquidity risks, different assumptions of Value-at-Risk and sensitivity analysis, and different forms of capital structure reporting. As the release of the standard disclosure requirement – the Basel Accord II, Oliveira et al. (2011) wish the Portuguese government could adopt more effective enforcement mechanisms such as Basel II to broker compliance with minimum mandatory risk disclosure requirements among these Portuguese banks.

Mention (2011) examines the voluntary reporting practices of intellectual capital (IC) by leading European banks. The sample period of this empirical study is 2001–2009 (prior and after the implementation of the Basel Accord II, in which the Basel Accord II was implemented in 2004). The finding indicates that the reporting of IC information occurs mainly in a narrative form among these European banks, and is seldom factual and verifiable. Forward-looking information is extremely rare, as well as quantified information. In relative terms, relational capital is the most reported category, followed by human and structural capital. Over the period of 2001–2009, a strong upward trend is observed for the reporting of structural capital, suggesting an increased awareness of the importance of strong management process and corporate culture. Disclosure levels of human and relational capital are also relatively high. Similar to Mention (2011), the study conducted by Ahmed Haji and Mubaraq (2012) examines the IC disclosure practices of Nigerian banks following the Nigerian restructuring exercise and subsequent policy changes in the banking industry. During the period of 2006-2009, the banking industry in Nigeria went through a consolidation exercise by introducing the mandatory code of corporate governance into the banking industry. A

self-designed IC disclosure index by Ahmed Haji and Mubaraq (2012) is used to measure the extent of IC information disclosed in banks' annual reports. The results indicate that the overall IC disclosures among the Nigerian banks had increased moderately over the period of 2006-2009, and human and internal capital disclosures compose the main part of banks' IC disclosures.

Sobhani et al. (2012) analyse the sustainability information disclosure among banks in Bangladesh during the year 2009, in which the sustainability information disclosure refers to the information disclosure concerning social welfare and green awareness. Sobhani et al. (2012) reveal that the information disclosure in these banks' annual reports has more sustainability feature than the information disclosure in these banks' websites. Furthermore, the newly established banks perform better in comparison to the long established banks, and the Islamic banks perform better in comparison to the conventional banks in this respect.

2.7 Summary

Through reviewing the literature, it seems that the call from the Basel Committee for an increase of banking information disclosure has been positively responded by the banking industry. This increased information disclosure in the banking industry is essential and meaningful, since banking information disclosure brings stability and safety to our economy. While there exist concerns of banking information disclosure such as the cost and privacy issues. Financial regulators, therefore, should be made aware of this, especially when designing new policies. The process of refining the regulation of banking information disclosure is still going today, as we see that the Basel Accord III is under drawing and intended to replace the Basel Accord II in 2019.

Hopefully, the concerns of banking information disclosure can be partially addressed by the Basel Accord III in the future.

Chapter 3

Short-Term Impact of Annual Report Disclosure on Bank's Stock Price - An Event Study

3.1 Introduction

In the previous chapter, this research has reviewed the broad literature regarding banking information disclosure. Though this research has been informed by previous literature that increased banking information disclosure is beneficial to maintain systemic stability, there is a lack of research addressing the direct impact of banking information disclosure on bank's stock price. In order to fill the gap by figuring out the immediate impact of banking information disclosure on bank's stock price, this research undertakes an event study by using the occasion of annual report disclosure. The annual report is released yearly which covers comprehensive information[12] of a bank, therefore it is a perfect proxy of information disclosure in conducting the event study.

The remaining chapter will be outlined as follows: section two introduces the event study and its use in testing market efficiency; section three details the procedure of conducting an event study; section four describes the data used in the current research

[12] The annual report is one of the most important information disclosure documents to communicate with shareholders, which covers comprehensive information of financial statement, shareholder information, governance, strategic report, risk review, and management duty. Among the reported elements of the annual report by a bank, the information disclosure of risk review and management duty has an international guideline 'Basel Accord' that directs the banking industry to report the information in a standard and rigid manner. Nowadays, more and more banks have started to comply with the principle and reporting standards in the Basel Accord when reporting their risk information.

to test market efficiency and the impact of annual report disclosure on bank's stock price; section five produces the empirical result; section six discusses the empirical meaning of the result and provides possible underlying reasons for the result; while section seven concludes this chapter in the end.

3.2 The Motivation of Conducting Event Study about Bank's Annual Report Disclosure

When talking about information disclosure, people would very easily associate it with its subsequent market reaction. The stock price itself is a reflection of numerous amounts of information. The market efficiency theory assumes that stock price has fully reflected all available market information and the change in stock price is caused by the emergence of new information. Fama (1970) states that there are three forms of market efficiency, namely weak form, semi-strong form and strong form. The weak form of market efficiency implies that stock price fully reflects all historical market information. The semi-strong form of market efficiency implies that stock price fully reflects all publically available information including historical market information and current market information. The strong form of market efficiency implies that stock price fully reflects all publically available information and private information including historical market information, current market information, and company inside information. Fama (1970) believes that market efficiency should exist at the level of the semi-strong form, which means, in general, stock price should fully reflect historical market information and current market information. For the strong form of market efficiency, as we have difficulty in obtaining the inside information of a company, it is difficult to verify its existence. In general, there are three impacts of newly arrived information on stock price - positive impact, negative impact or no

impact. We should be aware that although newly arrived information could have a significant impact on stock price, this impact might be temporary. In the longer term, there are numerous factors that can potentially affect stock price. Therefore, event study is mostly used to decide the short-term impact of newly arrived information on stock price (Kraus and Stoll, 1972; Elton et al., 2001). Bank's annual report disclosure can be treated as an occasion to conduct event study in testing the information impact on stock price, as annual report is one of the main vehicles to deliver information to the public.

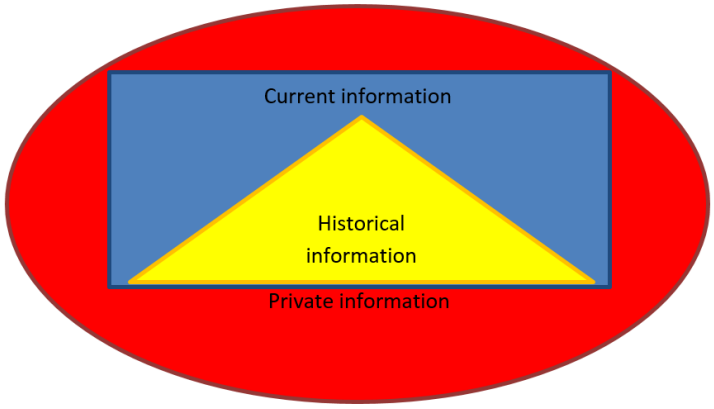


Figure 3.1 Market Efficiency Forms

This graph shows the relationships among three different forms of market efficiency. The weak form of market efficiency suggests that stock price only reflects historical market information. The semi-strong form of market efficiency implies that stock price fully reflects all publically available information including historical market information and current market information. The strong form of market efficiency implies that stock price fully reflects all publically available information and private information including historical market information, current market information, and company inside information.

Besides testing the impact of annual report disclosure on bank's stock price, another motivation of conducting event study is to test the hypothesis of market efficiency by seeing how quickly and how efficiently the market responds to newly arrived information. There are several studies using event study which are in support of market

efficiency. Grier and Albin (1973) analyse the impact of block trading[13] on the New York Stock Exchange, which shows that stock price would adjust to a significant change either in a positive or in a negative way within minutes after the announcement of block trading by institutional investors. Dodd and Ruback (1997) analyse the impact of announcement by the company which intends to bid the tender offer[14], and find that the company which has the intention to bid the tender offer would experience a significant increase in its stock price. The abnormal return has been observed days before the successful bidding of the tender offer which is due to information leakage, while additional abnormal return quickly ceases after the announcement of the bidding result. Thus, the phenomenon demonstrated by Dodd and Ruback (1997) is in support of market efficiency. Another evidence in support of market efficiency is shown in the case of takeover. Firth (1975) examines market efficiency with respect to the announcement of takeover, which points out that the market views the purchase of a substantial percentage of a company as a good signal for the company that intends to acquire. Similarly, for the company that to be acquired, positive abnormal returns on stock price are observed days before the announcement of takeover. Firth (1975) argues that the appearance of abnormal returns before the announcement does not violate market efficiency, it only reflects the fact that the market efficiently anticipates the event of takeover. After the announcement of takeover, additional abnormal return quickly ceases and the cumulative abnormal return levels off which suggests that the

[13] The block trading stands for an order of sale or purchase for a significantly large amount of securities on the stock market. The block trading is often undertaken by institutional investors in a purpose of capital restructuring.

[14] A tender offer is a type of public takeover bid, which is a public open announcement (normally announced through media channels) by a prospective acquirer to the stockholders of a publicly listed company to tender their stocks for sale at a certain price during a certain time period. The prospective acquirer usually offers a higher stock price than the current stock price for the company that to be acquired.

market is efficient in reflecting the fact of takeover and no more adjustments are needed.

Two cases used very often by event study to test market efficiency are dividend payment and stock split. In general, both dividend payment and stock split would have a positive impact on stock price which leads to positive abnormal returns. The impact has been manifested within days after the announcement of dividend payment or stock split, which are in support of market efficiency. Examples of using event study in testing market efficiency through the case of dividend payment can be found in Pettit (1972), Watts (1973), Aharony and Swary (1980), and Dasilas and Leventis (2011). Examples of using event study in testing market efficiency through the case of stock split can be found in Charest (1978), and Lamoureux and Poon (1987), and Ikenberry and Ramnath (2002).

On the other hand, using event study also produces evidence in refutation of market efficiency, in which the two most salient market anomalies against market efficiency are market over-reaction and market under-reaction.

Numerous empirical studies using event study such as Bondt and Thaler (1985, 1987), Chopra et al. (1992), Govindaraj et al. (2004), and Boubaker et al. (2015) demonstrate the phenomenon of market over-reaction, as there are significant abnormal reversals followed by significant abnormal returns. Researchers collectively attribute the reasons of market overreaction to cognitive biases such as minimising regret and maximising self-esteem. Kahneman and Tversky (1982) argue that the market over-reaction is caused by the abrupt appearance of news which is not in line with investors' expectations, no matter whether the news is good or bad. Griffin and Tversky (1992), and Barberis et al. (1998) attribute the reason for market over-reaction to people's

overconfidence in their initial judgments on market information, which the initial judgment is short of comprehensive and rigid analysis. Moreover, the bias of overconfidence escalates market volatility, since under a market with a certain amount of overconfident traders, smart traders namely the professional stock analysts could only play a limited role in leading the right direction for the market.

In the meantime, numerous studies using event study such as Ikenberry et al. (1995), Ikenberry and Ramnath (2002), and Frazzini (2006) demonstrate the phenomenon of market under-reaction, as there are continuous abnormal drifts in return followed by an event. Behaviour explanations are also proposed to interpret the market under-reaction. Daniel et al. (1998) believe that investors suffer from the self-attribution bias who put a lot of weight on their initial belief and are reluctant to acknowledge newly arrived information changes. Only by encountering extreme contradictory information with the previous belief, investors would try to adjust their behaviours. Besides the self-attribution bias, the overconfidence bias also contributes to the phenomenon of market under-reaction such that investors overestimate their own ability and are overconfident in their intuitive judgment. Barberis et al. (1998) attribute the reason of market under-reaction to the conservatism bias meaning that investors are slow in responding to newly arrived information. Hong and Stein (1999) explain the market under-reaction by analysing the behaviours of two heterogeneous groups – bearish investors[15] and bullish investors[16]. Bearish investors will be reluctant to invest in the market initially. As positive news diffuses around the market, bearish investors will slowly change their minds and take investing activities. Therefore, the action

[15] Bearish investors stand for the people who hold a pessimistic view of the market and believe stock price will decrease in the coming period.
[16] Bullish investors stand for the people who hold an optimistic view of the market and believe stock price will increase in the coming period.

conducted by the bearish investor results in market momentum, and the market momentum is one kind of market under-reaction.

Conducting event study about bank's annual report disclosure forms a novel edge for the current research and adds new visions to the research domain of event study, since past literature has not viewed event study from the perspective of annual report disclosure. The past literature of event study basically covers two types of events – the economy-wide event such as market shocks, regulatory changes, and extraordinary events, and the corporate event such as debt or equity issues, mergers and acquisitions, corporate reorganisations, and investment decisions (McKinley, 1997). Under the category of the corporate event, no research has touched upon the annual report disclosure yet.

3.3 The Testing Procedure of Event Study

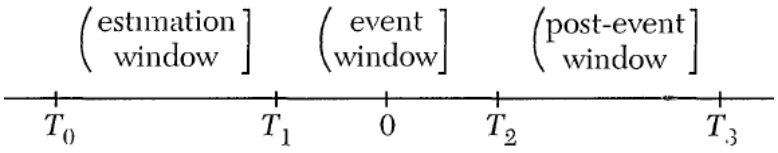


Figure 3.2 The Time Framework of Event Study

(Source: MacKinlasy, 1997)

The figure above demonstrates the time framework when conducting an event study. The model in predicting the expected return is estimated under the estimation window. The estimated regression model can be the constant mean return model which assumes that the expected return is the average return of the estimation period, or the market model which correlates the security return with the market index return, or the economic model such as CAPM and APT, etc. The event window is used to get the abnormal return by calculating the difference between the actual return and the abnormal return. The event date is normally in the middle of the event window. The post-event window is made redundant in most event studies, though under several cases the post-event window can also be used as the function of the estimation window. The data used under the time framework of event study is normally daily data. The time period of the estimation window, which is the period from T_0 to T_1, is generally composed of the daily data spanning the period of several hundred days such as 100 days, 250 days, etc. The time period of the event window, which is the period from T_1 to T_2, is generally composed of the daily data spanning the period of several days such as 11 days, 31 days, etc.

A. Research Sample

The first step in conducting an event study is to construct a research sample. The event study is one of many tools to test market efficiency, thus the research sample should be built around the goal to test how the market responds to newly arrived information. The newly arrived information can be the announcement of stock dividend, stock split, earnings, etc. and the newly arrived information can be more comprehensive like the annual report of a company. The newly arrived information can also be very occasional as in the case of the 911 terrorist attack in New York. A group of companies which have a common exposure to a certain event can be put into the data pool of an event study.

B. Determining the Event Date

Determining the event date is crucial in event study, since the study is conducted around the time when a specific event happens. In general, the event date is chosen as the day when the event happens such as the announcement day of stock dividend, the announcement day of stock split, the announcement day of earnings, etc., though in several cases the event timing can also be the minute or the month when the event happens[17]. In the usual case when choosing the event date as a specific day, the event study will designate the event date as day zero and put this date in the middle of the event window.

[17] In most cases, the event study chooses daily data for analysis. The adaptation of monthly data is observed in several event studies if the event has a significant and in-depth meaning that lingers into the future. However, the adoption of monthly data in event study has a potential bias, since there are many factors in the longer term that can potentially affect the stock price besides the designated event.

C. Defining the Period to Be Analysed

There are two periods that need to be specified in event study. One is the estimation period (estimation window) which is the period used to get the regression model in order to calculate the expected return. The other is the event period (event window) which is the period used to calculate the abnormal return which is the difference between the actual return and the expected return. The visualised image of the estimation period and event period is shown in figure 3.2. The estimation period is from T_0 to T_1, in which the time length of the estimation period can be up to 100 days or even 250 days. The event period is from T_1 to T_2, in which the time length of the event period can be up to 16 days or even 31 days.

D. Choosing an Equilibrium Model under the Estimation Window

In order to get the expected return, an equilibrium regression model should be applied. The regression model is obtained through the estimation window. A number of regression models can be assumed under the estimation window such as the constant mean return model, the factor model, the market model, the capital asset pricing model, and the arbitrage pricing model. These regression models can be loosely categorized into two groups: the statistical model and the economic model. The statistical model such as the constant mean return model assumes that individual returns are jointly multivariate normally distributed across the defined time period. The economic model such as the asset pricing model not only considers the statistical meaning of the model but also considers the reality meaning of the model (Campbell et al., 1997).

Shown below, this research introduces several commonly used models in estimating the expected return:

- The constant mean return model

$$ER_{it} = u_i + e_{it} \quad (3.1)$$

The constant mean return model is the simplest model in estimating the expected return of a given security. In equation 3.1, u_i stands for the mathematical mean return during a specific time period, in which the specific time period is the defined estimation window in event study. The time length of the estimation window in calculating the mean return varies in previous research, for example, Campbell, Lo, and MacKinaly (1997) uses 250 days as the estimation window to calculate the mean return, MacKinlay (1997) uses 120 trading days as the estimation window to calculate the mean return, and Masulis (1980) uses two separate periods which are 60 days before and 60 days after the event window as the estimation window to calculate the mean return. e_{it} is the error term. Under the constant mean return model, the expected return is assumed to be constant throughout the event window. Although the constant mean return model seems very simple, several empirical studies (e.g. Lakonishok and Vermaelen, 1990; MacKinlay, 1997) have proved that the constant mean return model has similar estimation power to other complicated models in return prediction.

- The market index model[18]

$$ER_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (3.2)$$

The market index model correlates the individual security return with the market index return. As shown in equation 3.2, α_i is the intercept of the regression model, β_i is the coefficient of the market index return relating to the individual security return, R_{mt} is the market index return, and ε_{it} is the error term. Under the estimation window, the ordinary least squares (OLS) method is usually applied in finding the parameters of this regression model. A higher R-squared value of this model suggests a higher

[18] This research will adopt the market index model in estimating the expected return.

explaining role and a greater variance reduction. Campbell et al. (1997) believe that the market index model has a significant improvement in measuring the expected return than the constant mean return model, since the market index model greatly reduces the variance of expected return by considering the correlation between individual stock return and market return.

- The capital asset pricing model

As shown in equation 3.3, the expected return $E(R_i)$ can be divided into two parts: the expected risk-free rate $E(R_0)$ and the expected return rewarded from bearing market risk $\beta[E(R_m) - E(R_0)]$. β is the coefficient of the expected market risk premium. A stock with higher beta represents a higher risk but may compensate investors a higher return. $[E(R_m) - E(R_0)]$ is the expected risk premium.

$$E(R_i) = E(R_0) + \beta[E(R_m) - E(R_0)] \quad (3.3)$$

The modern CAPM is written as equation 3.4, where $E(R_{it})$ stands for the expected return, $(R_{mt} - R_{ft})$ is the market risk factor, α_i is the intercept which stands for factors that are unable to be explained by the market risk, R_{mt} stands for the market return, R_{ft} stands for the risk-free rate, β_i stands for the stock sensitivity to the market risk premium and ε_{it} stands for the error term.

$$E(R_{it}) = \alpha_i + R_{ft} + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it} \quad (3.4)$$

Compared to the market index model, Brown and Warner (1985) have found no evidence indicating that the CAPM is superior in predicting the expected return, and believe that the CAPM could be regarded as a special case of the market index model.

- The arbitrage pricing model in estimating the expected return

Ross (1976) presents the arbitrage pricing theory (APT) derived from the law of one price: if two items are the same, they cannot be sold at different prices. Unlike the CAPM, the assumption of a mean-variance market portfolio is not needed in deriving the APT. The APT uses different economic variables to predict the stock return. The model is shown in equation 3.5, where a_i is the constant term, I stands for different economic factors that could affect the expected return, b is the coefficient of the economic factor, and e_i is the error term. The economic factor should be significant in explaining the expected return, and different economic factors should not be correlated with each other. The economic factors can be inflation, GDP growth, interest rate, etc. The company specific variables are not included in the context of the APT. Chen et al. (1986) find that industrial production, inflation, shifting in the yield curve and change in the risk premium of corporate bonds are significantly economic factors in explaining the variation of expected return. The APT can be treated as a special case of the multi-factor model under the context of arbitrage equilibrium.

$$E(R_i) = a_i + b_{1i}I_1 + b_{2i}I_2 + b_{3i}I_3 + \cdots + b_{ji}I_j + e_i \tag{3.5}$$

Any model described above can be used as an equilibrium model in estimating the expected return, though the market index model is the most popular one used by the previous research in estimating the expected return.

E. Calculating the Abnormal Return and Its Statistical Significance

The method to calculate the abnormal return is shown in equation 3.6, where AR_{it} stands for the abnormal return, R_{it} stands for the actual return and ER_{it} stands for the expected return. The expected return is estimated by one of the equilibrium models described above. The corresponding period of equation 3.6 is the event window.

$$AR_{i,t} = R_{i,t} - ER_{i,t} \tag{3.6}$$

Normally, one event observation is not enough to give a conclusive result, and thus we need several event observations. After calculating the abnormal returns through these event observations, we need to aggregate these individual abnormal returns together. The average abnormal return for each day in the event window should be calculated through this method.

Shown by equation 3.7, if sampling a large amount of abnormal returns, the distribution of these abnormal returns should follow the normal distribution.

$$AR_i \sim N(0, \sigma^2(AR_i)) \tag{3.7}$$

While analysing the variance, it often uses the t-test to judge the significance of the variance of abnormal returns. The t-statistic can be calculated as equation 3.8, in which the abnormal return is divided by the standard deviation of abnormal returns in the estimation window.

$$\text{t} - \text{statistic} = \frac{AR_{i,t}}{S_{AR_i}} \tag{3.8}$$

However, the traditional t-test which is shown in equation 3.8 may overlook the issues of cross-sectional correlation of abnormal returns and distortions from event-induced volatility changes, leading to an over-rejection of the null hypothesis of zero average abnormal returns (Kolari and Pynnönen, 2010). There are several attempts to modify the shortcomings of the t-test. Patell (1976) suggests standardising each AR_i before the test statistic by the forecast-error corrected standard deviation. The standardised abnormal return ($SAR_{i,t}$) can be calculated as below.

$$SAR_{i,t} = \frac{AR_{i,t}}{S_{AR_{i,t}}} \tag{3.9}$$

Patell (1976) adjusts the standard error by the forecast error, since the event-window abnormal returns are out-of-sample predictions. As shown in equation 3.10, T_0 is the first day of the estimation window, T_1 is the last day of the estimation window, S_{AR_i} is the standard deviation of abnormal returns in the estimation window, M_i is the number of matched returns in the estimation window, $R_{m,t}$ is the matched return in the estimation window, and $\bar{R}_m$ is the average value of the matched returns in the estimation window.

$$S_{AR_{i,t}}^2 = S_{AR_i}^2\left(1 + \frac{1}{M_i} + \frac{(R_{m,t}-\bar{R}_m)^2}{\sum_{t=T_0}^{T_1}(R_{m,t}-\bar{R}_m)^2}\right) \tag{3.10}$$

The Patell or the standardised residual test statistic on day *t* during the event window can be calculated by equation 3.11, where M_i is the number of matched returns in the estimation window, $SAR_{i,t}$ is distributed as a t-distribution with $M_i - 2$ degrees of freedom under the null hypothesis of $SAR = 0$, $SSAR_t$ is the sum of the standardised abnormal returns over the sample and $S_{Patell-SSAR_t}$ can be obtained through equation 3.12.

$$Z_{Patell} = \frac{SSAR_t}{S_{Patell-SSAR_t}} \tag{3.11}$$

$$S_{Patell-SSAR_t}^2 = \sum_{i=1}^{N}\frac{M_i-2}{M_i-4} \tag{3.12}$$

Similarly, Boehmer et al. (1991) propose a standardised cross-sectional test which is robust to the variance induced by the event. The Boehmer, Musumeci and Poulsen (BMP) test statistic on day *t* during the event window can be calculated by equation 3.13, where *N* stands for the number of events, $SSAR_t$ is defined as the same in the Patell test, and $S_{BMP-SSAR_t}$ can be obtained through equation 3.14.

$$Z_{BMP} = \frac{SSAR_t}{\sqrt{N}S_{BMP-SSAR_t}} \tag{3.13}$$

$$S^2_{BMP-SSAR_t} = \frac{1}{N-1}\sum_{i=1}^{N}(SAR_{i,t} - \frac{1}{N}\sum_{i=1}^{N} SAR_{i,t}) \quad (3.14)$$

Furthermore, Kolari and Pynnönen (2010) propose an adjusted model to the BMP model which takes into account the cross-correlation of abnormal returns. The adjusted-BMP (ADJ-BMP) test statistic on day *t* during the event window can be calculated by equation 3.15, where N stands for the number of events, $SSAR_t$ is defined as the same in the Patell test, $S_{BMP-SSAR_t}$ can be obtained through equation 3.14, and $\bar{r}$ is the average value of the sample cross-correlation of the estimation period abnormal returns.

$$Z_{ADJ-BMP} = \frac{SSAR_t}{\sqrt{N}S_{BMP-SSAR_t}}\sqrt{\frac{1-\bar{r}}{1+(N-1)\bar{r}}} \quad (3.15)$$

F. Calculating the Cumulative Abnormal Return

Besides the abnormal return, the cumulative abnormal return is crucial in estimating the impact of an event. If we choose daily data in analysis, the cumulative abnormal return is the sum of abnormal returns of each individual day.

G. Examining and Discussing the Result

The final step of event study is to analyse and discuss the empirical result.

3.4 Sample Design and Data

The current research uses the event study to investigate the impact of information disclosure on the stock price of the banking industry. The disclosure of annual report is considered as the occasion of an "event" to conduct the study.

We choose the top sixty banks internationally[19] by the rank of their asset size at the end of 2013 as the research sample. Most of the banks have been listed on stock markets, but there are still ten banks among the full sample not being listed on any stock market. The unlisted ten banks[20] within the top sixty are relatively small banks. Some large banks are not listed on stock markets, such as Group BPCE[21] which is due to its newly establishment. Therefore, the sample has a total of fifty banks out of the top sixty banks.

The event study designates the disclosure date of the annual report for each of the banks in the sample as day 0. The current research has tried its best to find the exact disclosure date of annual report for each of the banks in the sample from the year 1996 to the year 2013. However, not all the disclosure dates of annual reports are traceable[22].

The event window includes a total of 11 days, where the interval of the event window is (-5, +5). We follow Brown and Warner (1985) to designate the interval span of the event window as the (-5, +5) interval, since they report that the testing power decreases when the abnormal return occurs beyond the (-5, +5) interval. The estimation window for the regression model is 120 days before the event window.

[19] Further information regarding the rank of the world's top banks can be traced through the website http://www.relbanks.com/worlds-top-banks/assets-2013.

[20] The ten banks out of the top sixty not being listed on the market are: Japan Post Bank (from Japan, ranked 13th), Groupe BPCE (from France, ranked 18th), Rabobank Group (from Netherlands, ranked 29th), Postal Savings Bank of China (from China, ranked 30th), Credit Mutuel Group (from France, ranked 32nd), Norinchukin Bank (from Japan, ranked 36th), KfW Group (from Germany, ranked 46th), DZ Bank AG (from Germany, ranked 55th), La Caixa Group (from Spain, ranked 59th), and Cassa Depositi e Prestiti (from Italy, ranked 60th).

[21] As a result of the 2008 financial crisis, Caisse Nationale des Caisses D'épargne (CNCD) and Banque Fédérale des Banques Populaires (BFBP) merged in the year 2009 to become the second largest bank in France known as Group BPCE.

[22] The current research has tried its best to look through the historical record of bank's website to trace the disclosure date of the annual report. Banks may clearly indicate the exact disclosure date in its annual report. Another way to find the disclosure date of the annual report is through bank's website, there is an event calendar under the section of investor relation in bank's website, and the event calendar contains the historical disclosure date of annual report.

The daily stock return of the event study is calculated through the daily stock price, in which the model is shown as equation 3.9. The stock price (RI) that includes the dividend as reinvestment is obtained from DataStream.

$$r_{i,t} = \ln(p_{i,t} / p_{i,t-1}) \tag{3.16}$$

The stock price of each bank is chosen from the market where the bank is headquartered. For those Chinese banks listed on both Shanghai Stock Exchange ('A' share) and Hong Kong Stock Exchange ('H' share), we choose the market in which the stock has a longer listing period.

Since this research has decided to use the market index model which is equation 3.2 to estimate the expected return, the market index becomes crucial in utilising the equation. The market indices chosen in this research include Hang Seng (Hong Kong), FTSE 100 (UK), CAC 40 (French), Nikkei 225 (Japan), S&P 500 (USA), DAX (Germany), IBEX 35 (Spain), FTSE MIB (Italy), SMI (Switzerland), AEX (Netherlands), OMX (Sweden), S&P TSX (Canada), S&P ASX 200 (Australia), Shanghai Composite Index (China), OMXC 20 (Denmark), and Russian MICEX (Russia). Again, all the data of these market indices are downloaded from DataStream and calculated into the return form by equation 3.9. The ordinary least squares (OLS) regression with clustered standard errors is used to find the corresponding parameters when utilising equation 3.2.

3.5 Empirical Results

Event Window	Abnormal Return	ADJ-BMP Test Statistic	Cumulative Abnormal Return
-5	0.0010	0.77	0.0010
-4	0.0002	0.11	0.0012
-3	-0.0005	-0.34	0.0007
-2	0.0012	0.91	0.0019
-1	-0.0004	-0.32	0.0014
0	-0.0006	-0.43	0.0008
1	-0.0004	-0.28	0.0005
2	0.0009	0.71	0.0014
3	-0.0025	-1.98**	-0.0011
4	-0.0006	-0.39	-0.0017
5	0.0006	0.45	-0.0011

Table 3.1 The Empirical Result of the Event Study

The table above demonstrates the empirical result of the event study which includes abnormal return, ADJ-BMP test statistic of abnormal return, and cumulative abnormal return. *, **, *** denote the statistical significance at 10%, 5%, and 1% level respectively. The event date is the disclosure date of the annual report by a bank. The sample comprises fifty world's top banks (by asset size in 2013) and the sample period is 1996-2013. Considering the data availability regarding the listing status of banks and the traceable disclosure date of annual reports, this research has obtained 416 event observations. The estimation window is 120 days ahead of the event window. The regression model is the market index model and the ordinary least squares (OLS) regression with clustered standard errors is used to find the corresponding parameters of the market index model.

The abnormal return and the cumulative abnormal return are both the average figures that are based on the 416 event observations[23]. As shown in the table above, within the event window, only day 3 has the abnormal return –0.25% with statistical significance at 5% level. The cumulative abnormal return in day 3 is – 0.0011. Before day 3, the cumulative abnormal return is positive, and after day 3, the cumulative abnormal return turns out to be negative. Within the event window of the 11 days, there are 6 days with a negative abnormal return and 5 days with a positive abnormal return. The signs of these abnormal returns within the event window have no clear pattern.

[23] Considering the data availability with regard to the listing status of banks and the traceable disclosure date of annual reports, this research has obtained 416 event observations.

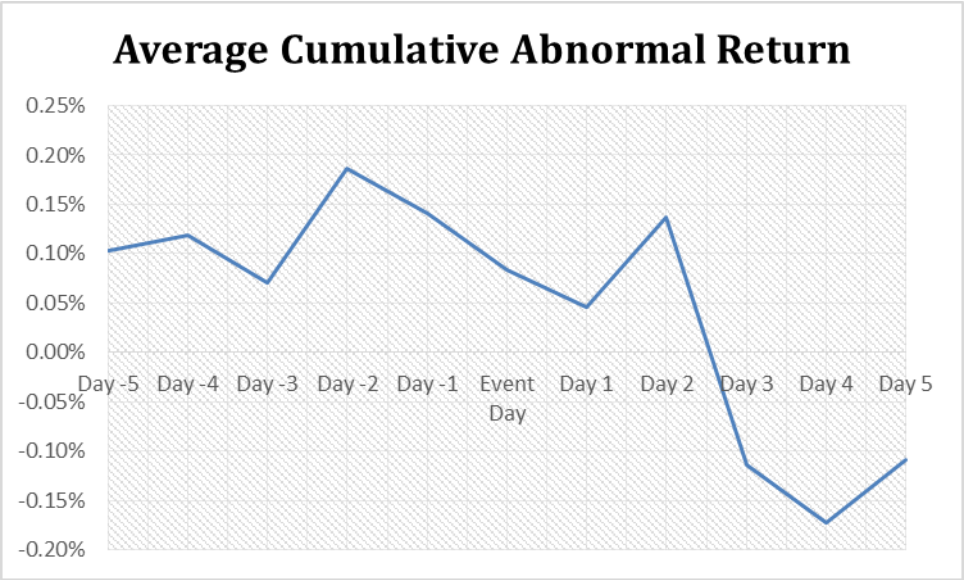


Figure 3.3 The Average Cumulative Abnormal Return

The figure above visualises the average cumulative abnormal return for the sample of 416 event observations. The horizontal axis designates the day within the event window, and the vertical axis designates the percentage ratio of the average cumulative abnormal return. The sample is comprised of the world's top sixty banks (by the asset size of 2013) and the sample period is 1996-2013. The event date is the disclosure date of the annual report by a bank. The event window has a total of 11 days that includes the event day itself. The estimation window is 120 days ahead of the event window. The regression model is the market index model and the ordinary least squares (OLS) regression with clustered standard errors is applied to find the parameters of the market index model.

Figure 3.3 depicts the change of the average cumulative abnormal returns across the event window. From this visualised image, it is not hard to find that day 3 has experienced a sharp decline of the average cumulative abnormal return, which drives the average cumulative abnormal return from approximately 0.15% in day 2 to approximately -0.10% in day 3. Before day 3, the average cumulative abnormal return is levelled around 0.10%, and after day 3, the average cumulative abnormal return is levelled around -0.125%.

3.6 Discussion

From the empirical result, over the period 1996-2013, the disclosure of annual report in the banking industry has shown a negative impact on stock price. This negative

impact has not been reflected in the stock price immediately by the release of the annual report, in which the negative impact is shown three days after the event. This empirical finding suggests that the market on average views the information within the annual reports of these banks as bad news over the period 1996-2013.

Moreover, based on the pattern of the cumulative abnormal returns over the event window, this research has not been able to find the evidence in support of market efficiency which claims that the stock price has instantly and sufficiently reflected the newly arrived information. The pattern shown in figure 3.3, however, indicates that the market under-reacts to the newly arrived information. The content of information in bank's annual report is massive and includes financial statement, shareholder information, governance, strategic report, risk review and management. The current result has no power to indicate which set of information specifically in bank's annual report plays a negative role in reducing the stock price, but one thing for sure is that the general content of information in bank's annual report has an overall negative impact on bank's stock price.

Among the existing literature, there is no research using event study to examine the immediate impact of annual report disclosure on stock price, therefore there is a lack of references to compare. However, this research has found several studies which can explain the empirical result derived from the current research in certain aspects.

Brown et al. (1988) find that investors generally respond in a negative way to uncertain information which is due to the psychological need of risk aversion. The release of uncertain information will make investors feel higher uncertainty of the prospect of a company, and this higher uncertainty will make investors require a higher return by holding the stock of the company which drives down its stock price. The event study

carried out by Brown et al. (1988) also shows that the market usually responds to uncertain information in a time-lagged manner, though Brown et al. (1988) have not explained in detail the reasons for the lagged response.

Campbell and Hentschel (1992) document the phenomenon which has been mentioned in previous studies – 'no news is good news'. It seems plausible that market volatility will be raised by newly appeared information. Higher volatility is a potential risk for investors, therefore a higher expected return will be imposed on the stock and a lower current stock price will be materialized. Using the model of changing variance (a quadratic generalised autoregressive conditionally heteroskedastic or QGACH model), Campbell and Hentschel (1992) prove that the volatility feedback effect is important during the high volatility period. Under the case of annual report disclosure, the release of the annual report has the power to increase the stock return volatility of a company, which will subsequently raise the expected return and decrease the value of its current stock price.

Compared to good news, it seems that the market needs more time to assimilate and accept bad news. Taffler et al. (2004) analyse the stock price reaction to the disclosure of UK going-concern audit report in the calendar year subsequent to the report disclosure year. Over this period, the firms in the sample underperformed by between 24% and 31% compared with their expected returns. The phenomenon of market under-reaction to such report release contained with bad news is demonstrated by the post-earning announcement drifts in stock return. Whatever the reasons for such stock mispricing, Taffler et al. (2004) believe that the costly arbitrage which prevents rational investors bringing stock prices back to fundamental values could not be neglected. Meanwhile, Taffler et al. (2004) do not reject the behavioural proposition that investors are, in fact, biased in their ability to process the bad news conveyed by

the going-concern audit report. Frazzini (2006) points out that the market under-reaction to bad news is caused by the disposition effect, which states that investors are unwilling to recognize losses and willing to realise gains. Using the event study with a sample of firms from the Carbon Disclosure Project (CDP) Korea in 2008 and 2009, Lee et al. (2015) investigate the market response to firms' voluntary carbon information disclosure. Their empirical result suggests that the market is likely to respond in a negative way to firms' carbon disclosure, implying that investors tend to perceive carbon disclosure as bad news and care about potential costs facing firms for addressing the issue of carbon disclosure. In addition, the drifts of negative return are also observed following the carbon disclosure, which suggests that the market under-reacts to the bad news contained within the CDP.

However, we should note that the event study is only useful in determining the short-term impact of a certain event on stock price. From the empirical result of the current research, the disclosure of annual report has a short-term detrimental impact on bank's stock price. Whereas, the impact of the annual report disclosure in the longer term might be positive on bank's stock price. Bhat (2008) finds a positive association between information disclosure and stock's fair value. Bhat (2008) quantifies the information disclosure of sampled banks into an index and uses regression analysis to test the coefficient of the index. Several control variables are also added into the regression model. Since the coefficient of the index is positive and statistically significant, Bhat (2008) argues that information disclosure is helpful to increase stock's fair value and aid market participants in estimating share prices. In particular, the modified banking estimation sensitivity disclosure by SFAS [24] assists market

[24] The SFAS stands for the Statement of Financial Accounting Standards, which details policies and accounting rules in the financial report of a company.

participants in interpreting financial information and forecasting future share price. Bhattacharya et al. (2002) explore the link between the earning opacity and the trading volume in different countries. Bhattacharya et al. (2002) have measured three dimensions of the earning opacity which are earning aggressiveness, loss avoidance, and earning smoothing. By controlling the influence of other financial variables, the general finding is that an increase of the earning opacity leads to a decrease of stock trading volume and an increase of stock fair value. Dye (1985) analyses the impact of information disclosure on stock price, in which he finds that shareholders prefer the company which has disclosed relatively large amounts of information. If there is no information disclosure for a specific company, the company stock will become less popular in the market and lead to a lower market price. A company with a popular market focus is easier to raise demand for its stock and result in a higher market price. Baumann and Nier (2004) investigate the relationship between the stock return volatility and the information disclosure of a bank, and find that the bank which has disclosed more information will have a lower stock return volatility. The lower stock return volatility offers the bank a lower cost of capital and a higher market valuation when it seeks to finance from the market.

Besides investigating the short-term impact of annual report disclosure, another goal of this research is to examine the market efficiency theory by seeing how quickly the market responds to the release of annual reports. The current research has not found evidence in support of the semi-strong form of market efficiency which claims that the market instantly and sufficiently reflects all the historical and current market information, since there is a lagged response to the release of annual reports. An intuitively possible explanation might be that the annual report is a comprehensive document depicting all sides of bank's performance, therefore the market needs some

time to digest the information of annual report and this digestion has caused this delay in response. The previous research using event study (e.g. Grier and Albin, 1973; Firth, 1975; Dodd and Ruback, 1997) has found evidence in support of the semi-strong form of market efficiency, in which the event itself in these studies is relatively simple and straightforward to comprehend by the market such as earning statement, dividend payment, stock split. Compared to these events, the event in the current research obviously needs more time and effort to be interpreted by the market.

Meanwhile, a new theory may shed fresh light on the definition of market efficiency. Lo (2004, 2005) reconciles the market efficiency with market anomalies by proposing the adaptive market hypothesis. Lo (2004, 2005) argues that market efficiency and market anomalies are not contradictory to each other, but they are compatible like two sides of a coin. Lo (2004, 2005) describes the financial world is like an ecosystem and the market investor is like a creature trying to survive in this ecosystem. The cognitive biases which lead to market anomalies – loss aversion, overconfidence, anchoring, mental accounting, etc. are like intuitive tactics to survive in this ecosystem. The financial analysis like the asset pricing model is the weapon used by investors in this ecosystem. The evolution of the financial system is constant just like the evolution of the ecosystem. Investors in the financial market always adjust their behaviours to the changing environment. As observed in the ecosystem and stated in the Charles Darwin's theory, only the most suitable ones will survive, and this fact also applies to the financial world. If this theory applies, the timing of the market's response to the newly arrived information might be varied from time to time, sometimes early, sometimes late. However, the direction of the trend in the change of the market is clear just like the change of the season in weather. Although the adaptive market hypothesis

is still at a very rudimentary stage with a qualitative phrase, Lo (2012) believes that this theory will have a profound impact on the financial world in the future.

3.7 Conclusion

Through the event study of annual report disclosure in the banking industry, this chapter has two findings to contribute.

First, the market on average views the information within the annual reports by banks as bad news over the period 1996-2013, since shortly after the annual report release, the stock price has been significantly and negatively affected. However, the event study could only target the short term impact, the impact of information disclosure might be different in the longer term.

Second, the empirical result of the event study does not fully support the semi-strong form of market efficiency, since there is a lagged response to the information disclosure. Two reasons are proposed to explain the lagged response. One is drawn from the behaviour perspective which suggests that the market is in general reluctant to accept bad news and thus needs more time to assimilate bad news into stock pricing. The other one is the intuitive speculation, which assumes that the depth and amount of information in bank's annual report needs more time and effort to be digested by the market compared to a relatively simple feature event such as dividend payment and stock split.

The annual report concludes all-around and comprehensive information of a bank. In the following chapters, this research will specifically look at the risk information disclosure, with the focus on the risk information disclosure status and its association with bank's performance.

Chapter 4

Risk Information Disclosure Status among World's Top Banks

A Look from the Perspectives of

Market and Operational Risk Information Disclosures

4.1 Introduction

Traditionally, credit risk that a borrower fails to meet the obligation under a contract is regarded as the biggest threat facing a bank. Among the existing literature, there is a relatively thorough discussion of credit risk and how to manage credit risk in the banking industry (e.g. Berger and Udell, 1990; Wong, 1997; Altman and Saunders, 1998; Jiménez and Saurina, 2004, 2006). In the modern banking industry, risk management is no longer only about credit risk. However, besides credit risk, other risk disclosures in the banking industry are rarely tackled by previous studies. Therefore, this research decides to take a look at other risk disclosures which are the market and operational risks in the banking industry. This chapter will present the disclosure status regarding the market and operational risks in the banking industry.

The most influential banking regulation guidance is the Basel Accord. The Basel Accord II was put forward in 2004. Compared to the Basel Accord I which only specifies the information disclosure of credit risk, the Basel Accord II has added the information disclosures of market risk and operational risk into regulations. Market

risk means the risk derived from the movements of market factors including interest rates, foreign exchange rates, credit spreads, commodity prices and equity prices, which may reduce asset value. Operational risk is the potential loss derived from inadequate processes including incidents related to people, systems or external events, which may also reduce asset value. In addition, operational risk covers several sub-categories, in which the two most important ones are reputation risk, and legal risk. Reputation risk derived from an event, action, investment or transaction can shake the trust of clients, shareholders, employees or broader public in the firm's competence and integrity. Legal risk is the loss derived from failures in complying with contractual obligations or in complying with regulations which the firm is subject to.

This research adopts the Value-at-Risk disclosure index (VaRDI) from Pérignon and Smith (2010) to measure the market risk information disclosure, and adopts the operational risk disclosure index (ORDI) from Goyal and Wu (2007) to measure the operational risk information disclosure. The research sample covers the world's top sixty banks ranked by asset size in 2013. The correlation between VaRDI and ORDI across the sample is 0.66 with 1% statistical significance.

This chapter is outlined as follows. Section two reviews several indices designed to measure the information disclosure in corporate finance. Section three introduces the VaRDI, and section four introduces the ORDI. Section five illustrates the data gathering process which includes data selection, data period and data sources. Section six and section seven present the statistical description of VaRDI and ORDI respectively for the world's top sixty banks and the average value for the corresponding countries which these banks originate from. Section eight is a comparison part in terms of the status of risk information disclosures with Pérignon and Smith (2010). As with Pérignon and Smith (2010), this comparison pays particular

attention to the banking industries in the US and Canada. Section nine briefly summarizes the findings of this chapter at the end.

4.2 Designed Indices in Measuring Information Disclosures

A designed index is widely used in the research of corporate finance to measure information disclosures:

To measure a certain amount of information released by manufacturing companies, Botosan (1997) designs a disclosure index covering six main elements of a company which are background information, ten or five-year summary of historical results, key non-financial statistics, projected information, and management discussion and analysis. The index is composited by analysing the information from the annual reports of manufacturing companies.

La Porta et al. (1998) investigate the protection level of corporate law on company's shareholders and creditors. In order to compare the difference of the protection among companies in different countries, La Porta et al. (1998) use six parameters to measure the rights of shareholders. Each parameter reflects one principle in protecting the rights of shareholders, and each parameter has a binary answer which is zero or one. If the law of a company has covered the issue relating to one specific parameter, the company will get one point from that parameter. In theory, the index in measuring the protection level could be scored from zero to six. However, in reality, La Porta et al. (1998) find no company scored over five.

To analyse the effect of information disclosures on stock return volatility, Bushee and Noe (2000) use the index from the Association for Investment and Management Research (AIMR). The AIMR published the disclosure practice index for 4314 firms

between 1982 and 1996. The goal of the index provided by the AIMR is to improve communications between company's governance and investment community. The AIMR disclosure index has not only focused on the information disclosure from firms' annual reports but also captured analysts' views and assessments.

Similar to the AIMR index, the Center for International Financial Analysis and Research (CIFAR) produced the corporate information disclosure index for 1000 companies around the world between 1993 and 1995. The CIFAR index considers seven main aspects of corporate information disclosures: general information, income statement, balance sheet, cash statement, accounting policy, stakeholder information, and supplementary information. Each aspect of the seven has its own sub-elements that a total of eighty-five variables are included in the index. Both of the indices provided from AIMR and CIFAR are in percentage terms. A higher percentage indicates a higher level of information disclosure. Theoretically, the highest score of the index is 100%. In the editing process of CIFAR, if a company has released information covering one variable of the total eighty-five variables, the index will add one point into the nominator, and the denominator is eighty-five which stands for all the eighty-five variables. If a specific item of the eighty-five variables is not applicable to the company, the index reduces one point from the denominator but the nominator remains unchanged. This step in editing the CIFAR index is not a fully satisfactory procedure, since it does not penalise the company which has not disclosed non-applicable items and the line between the non-applicable and the unavailable item is sometimes blurred. Despite this drawback, the CIFAR index is widely used in research. For instance, Hope (2003) uses the CIFAR index to find that an enhanced information disclosure would be helpful to increase the accuracy of analysts' estimations.

Khanna et al. (2004) use two indices to analyse the relationship between information disclosure and foreign firm's interaction with the US economy. The disclosure index in Khanna et al. (2004) is borrowed from the survey conducted by Standard and Poor (hereafter, S&P) in 2002 'Transparency and Disclosure Survey for companies in various countries around the world'. The Transparency and Disclosure index of S&P (2002) provides information disclosure ratings for 794 firms in 24 countries. The S&P created the index by examining company's annual reports and regulatory filings of 98 items. Under the S&P index, three main elements are considered and each main element contains several sub-elements: financial transparency and information disclosure (35 items), board and management (35 items) and ownership structure (28 items). The S&P index is a company-level index, Khanna et al. (2004) transform the company-level index into a country-level index. In measuring the intensity of market interaction, Khanna et al. (2004) design an index themselves by considering three factors which are capital, product, and labour. The sub-elements of the three main factors include a total of eleven variables, such as whether a company has been listed on US markets, whether a company has a direct investment in the US, whether a company has exported or imported from the US, etc. Each of the eleven sub-elements has a binary answer which is zero or one that contributes to the total score of the index.

The banking information disclosure could also be measured using composite indices. Baumann and Nier (2003, 2004) test the impacts of information transparency by a sample of six-hundred banks in thirty-one countries over the period 1993-2000. The transparency level is measured by three indices respectively. The first one is the index adopted from the Center for International Financial Analysis Research (CIFAR) which measures the transparency level for 1000 companies over the world in the 1990s. The second index is a binary index which only considers whether a bank has been listed on

the US stock market. The US stock market requires a significantly comprehensive information disclosure, thus the company listed on the US stock market is a good sign of a higher level of information disclosures. The third index is designed by Baumann and Nier (2003, 2004) which is an aggregate disclosure index. There are seventeen items under the index, which includes loans by maturity, loans by type, loans by counterparty, problem loans, problem loans by type, securities by type, securities by holding purpose, deposits by maturity, deposits by type of customer, money market funding, long-term funding, reserves, capital, contingent liabilities, off-balance sheet items, non-interest income and loan loss provisions. A designed disclosure index looking at the market risk information is exhibited in Hirtle (2007). Compared to the index of Baumann and Nier (2003, 2004) looking at a general information disclosure in the banking industry, the index of Hirtle (2007) looks specifically at the disclosures of market risk information in the banking industry. The information about the Value-at-Risk[25] is the main focus in composing this index. There are five categories in the index: the first category is an overall description of VaR which includes items of holding period, confidence level, yearly average VaR, year-end VaR, minimum and maximum of VaR, VaR limit, and histogram of VaRs. The second category is the VaR by its risk type seeing whether a bank has disclosed the risk type information about yearly average VaR, year-end VaR, and minimum and maximum VaR. The third category is the back-testing of VaR including the chart of daily profits and losses (P&L) versus daily VaR, and the number of days which the loss has exceeded VaR. The fourth category is related to market movements including the histogram of daily trading P&L, and the value of the largest daily loss. The fifth category considers the stress test of VaR, which includes items of stress test mentioning, stress test description, and stress

[25] The Value-at-Risk methodology is a forward-looking way to measure market risk, which states that the probability of loss on a portfolio over a given time horizon exceeds a certain amount of value is *p*.

test result. Each item will grant one point into the index if the bank has disclosed or presented relevant information in its annual report.

4.3 A Proposed Approach to Measure the Disclosure Level of Market Risk Information in the Banking Industry

In the Basel Accord II, the suggested approach by the Basel Committee to measure the market risk information disclosure is the Value-at-Risk analysis. The degree of transparency regarding the market risk information can be analysed around the issue of Value-at-Risk (VaR). VaR is a forward-looking method of measuring market risk, which gives investors an advantage to manage market risk and also helps financial regulators to better formulate policies. Financial analysts can also use the disclosed VaR information to compare the risk profiles among different assets.

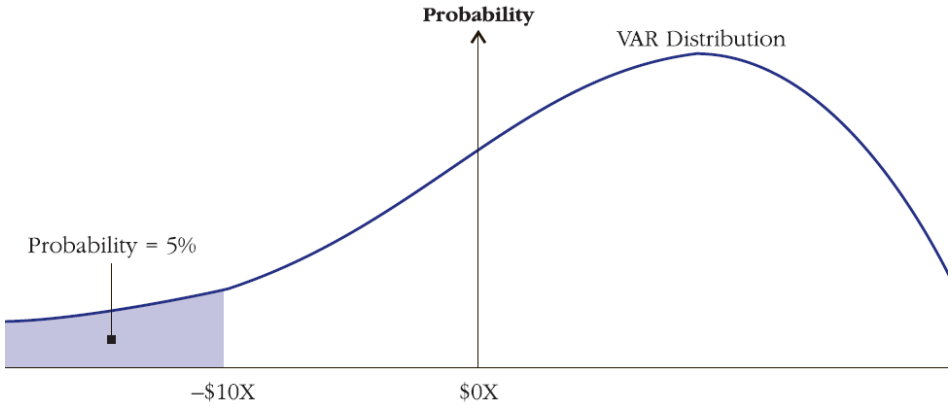


Figure 4.1 Value-at-Risk

(Source: Culp et al., 1998)

This graph illustrates the 5% probability of VaR at n-period is -$10X, which means that in the future n-period, there is a 5% probability the principal of an investment will lose $10X or more.

The graph shown above (Culp et al., 1998) gives a flavour of the basic idea about the theory of Value-at-Risk. The VaR distribution represents the distribution of returns for

an investment portfolio. In figure 5.1, a 5% confidence interval corresponds to the $10X loss, which means that there is a 5% chance that the investment will loss $10X or more in the future n-period.

There are mainly two ways for companies and banks to measure VaR, which are the historical simulation and the Monte-Carlo simulation. The historical simulation method predicts the future return by using the fact of the previous return, which assumes that the historical data has the capability to manifest the future performance. The Monte-Carlo simulation method predicts the future return by using computer software to randomly generate n[26] future returns based on an assumed distribution hypothesis, in which the distribution hypothesis can be a normal distribution but not necessarily be a normal distribution. Both of these two ways are widely adopted by banks. Each method has its own advantage: the historical method is relatively easy to implement; the Monte-Carlo simulation method can use any distribution hypothesis to model unlimited hypothetical returns, and the Monte-Carlo simulation method is especially useful when we conduct stress test.

Because of the emergence of the Basel Accord in the early 1990s, bank regulators have prodded the banking industry to adopt the VaR methodology to measure market risk. This strong recommendation of using VaR as the method to measure market risk has been slowly responded to by the banking industry. No banks in the early 1990s adopted the regulator's recommendation by using the VaR method to measure market risk. After 1995, the phrase of 'Value-at-Risk' gradually showed in the annual reports of several large banks such as HSBC and Barclays. Nowadays, nearly all US banks have adopted the VaR method in measuring market risk, and the US Securities and

[26] The number n can be 1000, 10,000 and even more, in which the bigger n will give a higher confidence level of prediction.

Exchange Commission (SEC) forcibly require all large and listed US banks to disclose the market risk information using the VaR method.

Another advantage point of VaR is its power to predict stock return volatility. Jorion (2002a) shows that the Value-at-Risk is informative for future stock return volatility. Jorion (2002a) regresses the stock return volatility on the lagged Value-at-Risk. The result shows that the VaR is a statistically significant factor in explaining the variation of future stock return volatility, i.e., the information regarding VaR is helpful in predicting future stock return volatility. Therefore, investors could more efficiently hedge market risk by the information disclosures about VaR. Furthermore, Jorion (2002b) proves that the change of VaRs is also positively correlated with the change of a bank's future trading revenues and that a bank which has reported a low VaR figure tends to have a limited downside risk in its future trading activity, and vice versa.

Pérignon and Smith (2010) design the Value-at-Risk disclosure index (VaRDI) to measure the quality and quantity of market risk information disclosures among the world's top banks. Our research adopts their method to measure the market risk information disclosures in the banking industry. By doing so, our research will give a comparison result with an updated period with Pérignon and Smith (2010).

VaRDI has 6 categories which monitor 6 facets of the VaR reporting quantity and quality.

- 1. VaR characteristics (maximum 2 points)
    a. 1 point – the holding period (e.g. 1 day, 1 week)
    b. 1 point – the confidence level (e.g. 95%, 99%)
- 2. VaR statistics (maximum 4 points)
    a. 1 point – the high, low or average VaR

b. 1 point – the year-end VaR

c. 1 point – the VaR risk category (e.g. currency, option, equity)

d. 1 point – considering the diversification effect

- 3. Intertemporal comparison (maximum 1 point)
  a. 1 point – compared with the previous year VaR
- 4. Daily VaR graph (maximum 2 points)
  a. 1 point – the histogram about daily VaRs
  b. OR 2 points – the plot of daily VaRs
- 5. Trading revenues (maximum 4 points)
  a. 1 point – the hypothetical revenue
  b. 1 point – the revenues deducted from the trading costs
  c. 1 point – the histogram of daily revenues
  d. OR 2 points – the plot of daily revenues
- 6. Back-testing (maximum 2 points)
  a. 1 point – the number of exceptions or 2 points – zero exception
  b. 1 point – the explanation of exceptions

Adding together the points each category graded, the highest score of VaRDI will be 15 and the lowest score of VaRDI will be 0.

The elements 1a, 1b, 2a, 2b, 6a and 6b within the VaRDI have covered all the concepts of the required market risk disclosures under the Basel Accord II, while the elements 1a, 1b, 2a and 3a within the VaRDI have covered certain concepts of the required market risk disclosures by the U.S. Securities and Exchange Commission (SEC). Therefore, the VaRDI is a comprehensive disclosure index not only considering the market risk information disclosures required by the Basel Accord II but also considering the market risk information disclosures required by the SEC standard. The

requirements of market risk information disclosures are slightly different between the Basel Accord II and the SEC standard. The disclosure of the year-end VaR is required under the Basel Accord II but not required under the SEC standard. The back-testing of VaR is required under the Basel Accord II but not required under the SEC standard. The intertemporal comparison of VaR is required under the SEC standard but not required under the Basel Accord II.

1a and 1b are the basic elements of VaR, which are required by both the Basel Accord II and the SEC standard. VaR assumes that an investment will not lose a certain amount of money in the future n-period under a certain confidence level (e.g. 95%). 1a reflects the holding period in the definition of VaR and awards a bank 1 point if the bank has reported the holding period of VaR, and 1b reflects the confidence level in the definition of VaR and awards a bank 1 point if the bank has reported the confidence level of VaR.

2a awards 1 point to the bank which has reported the range of VaR (high, low or average). 2b awards 1 point to the bank which has reported the year-end figure of VaR. 2c awards 1 point to the bank which has reported the category of VaR for different trading risks such as the trading risks regarding options, equities or bonds. Different assets may be correlated with each other, thus the bank is awarded 1 point (2d) if the bank has taken the consideration of the diversification effect of different assets into the calculation of VaR.

The report of the comparison of VaR (3a) is awarded 1 point; it does not matter whether the comparison of VaR is between the current year and the year before, or the comparison of VaR is between the current year and several years in the past.

The graphic view of VaR gives investors a direct sense of VaR status, so the VaRDI awards the bank which has released the VaR diagram in the form of histogram or plot. The plot of VaRs shows the trend of VaR. The plot is much easier than the histogram to pinpoint the loss exceeding the hypothetical value. For this reason, the plot of VaRs (4b) is awarded 2 points higher than the histogram of VaRs (4a) which is awarded 1 point.

VaR is concerned with the loss of trading activities, but the back-testing of VaR requires using relevant hypothetical revenues. The VaRDI, therefore, awards points for the disclosures of hypothetical revenue: 5a awards a bank 1 point if the bank has released the information on hypothetical revenue, and 5b awards a bank 1 point if the bank has considered the trading cost in calculating the hypothetical revenue. Visualising the hypothetical revenue will get additional points for banks. The plot of daily revenues depicts the change of hypothetical revenues over time, which is superior to the histogram of hypothetical revenues. Therefore, 5d awards 2 points to the bank for the plot of hypothetical revenues and 5c awards 1 point to the bank for the histogram of hypothetical revenues.

The category 6 of VaRDI deals with the VaR back-testing; 6a awards a bank 1 point if the bank has reported the number of exceptions when conducting the back-testing. In the case where there is zero exception under the back-testing which indicates that a bank is prudent in VaR reporting, 6a awards the bank 2 points. If a bank explains the reason behind the exceptions of VaR in a detailed manner, 6b awards the bank 1 point.

The categories 4 and 5 of VaRDI should be paid specific attention when allocating points. The maximum score for category 4 is 2. If a bank releases both the histogram and the plot of daily VaRs at the same time, the VaRDI does not allocate 1 point to 4a

and 2 points to 4b, instead it only allocates 1 point to 4a and 1 point to 4b, which will help to keep the maximum score of category 4 as 2. The maximum score for category 5 is 4. If a bank releases both the histogram and the plot of daily revenues at the same time, the VaRDI does not allocate 1 point to 5c and 2 points to 5d; instead it only allocates 1 point to 5c and 1 point to 5d, which will help to keep the maximum score of category 5 as 4.

4.4 A Proposed Approach to Measure the Disclosure Level of Operational Risk Information in the Banking Industry

As modern technology is widely implemented into the operation of the banking industry, the incidents related to people, systems or external events are becoming more likely than ever before. The concept of operational risk is new, but the facts the operational risks – at least part of them – have existed in the banking industry for decades. Many of the operational risks are due to the aftermath of the expansion of the banking industry, together with the fact that the banking industry in the twenty-first century is transforming itself into a digital stage. The subsequent legal and reputational risks derived from inappropriate operational procedures are detrimental to the health of the banking industry. The origins of legal and reputational risks are not fixed, and each incident has its own characteristics. As a comprehensive countermeasure, the Basel Accord II includes the operational risk disclosure as a mandatory disclosure practice for the banking industry.

Operational risk involves complex activities, and the Basel Committee has illustrated guidelines for the disclosures of operational risks. The Basel Accord II suggests that the operational risk disclosures should also include the controlling methods for operational risks. Senior management in the banking industry should set up necessary

procedures for measuring, monitoring, and controlling operational risks, particularly estimating the size and probability of operational incidents. The approach by including the controlling methods in operational risk disclosures is preventive and sound. The controlling methods of operational risks should constitute the main part of operational risk disclosures. The Basel Accord II lists several crucial qualitative elements for an effective operational risk control, including good management information system, senior management involvement, personnel training, strong internal control, and contingency planning (Chorafas, 2003). Moreover, since the new capital adequacy framework in the Basel Accord II requires capital reserves for operational risk, an enhanced operational risk control also needs advanced quantitative models to calculate the amount of adequate capital reserves for operational risks.

Our research adopts a composite index similar to the VaRDI to measure the quality and quantity of operational risk information disclosures among the world's top banks, which is the operational risk disclosure index (ORDI), and the ORDI is originally developed by Goyal and Wu (2007).

- 1. Recognition and definition of operational risk (maximum 3 points)
    a. 1 point – recognition and definition of operational risk as a risk exposure
    b. 1 point – recognition and definition of reputational risk as a risk exposure
    c. 1 point – recognition and definition of legal risk as a risk exposure
- 2. Operational risk capital (maximum 3 points)
    a. 1 point – operational risk capital reported in percentage terms
    b. OR 2 points – operational risk capital reported in currency terms

c. 1 point – the calculation method of operational risk capital explained under the Basel Accord II

- 3. Intertemporal comparison (maximum 1 point)

  a. 1 point – operational risk capital reported for previous years

- 4. Governance (maximum 3 points)

  a. 1 point – operational risk responsibility adopted into the governance structure

  b. 1 point – reputational risk responsibility adopted into the governance structure

  c. 1 point – legal risk responsibility adopted into the governance structure

- 5. Methodology/reporting (maximum 5 points)

  a. 1 point – operational risk measurement or assessment methodology

  b. 1 point – reputational risk measurement or assessment methodology

  c. 1 point – legal risk measurement or assessment methodology

  d. 1 point – operational loss data collection process

  e. 1 point – operational risk internal reporting procedure

Operational risk under the definition of the Basel Accord II is an unexpected loss that originates from people's fault, internal systemic error, outside unforeseeable event, etc. during the operational procedure. The ORDI pays attention to three risk perspectives – operational risk, reputational risk, and legal risk. The information disclosures of operational and legal risks are required under the Basel Accord II. Although the

reputational risk is not required under the Basel Accord II, it is interlinked with the operational and legal risks. In banks' annual reports, many banks clearly categorise the reputational risk as a sub-element of the operational risk or the legal risk.

The category 1 of ORDI considers whether a bank has briefly mentioned the information disclosures regarding operational risk, legal risk, and reputational risk in its annual report. 1a awards a bank 1 point if the bank has briefly mentioned operational risk information in its annual report, 1b awards a bank 1 point if the bank has briefly mentioned reputational risk information in its annual report, and 1c awards a bank 1 point if the bank has briefly mentioned the legal risk information in its annual report.

The category 2 of ORDI awards the report of the capital reserve for operational risks, which awards a bank 1 point if the bank has reported the required capital in percentage terms (2a) or 2 points if the bank has reported the required capital in currency terms (2b). The report of the operational risk capital indicates that the bank has used advanced technology and has hired skilful people in controlling operational risk. Additionally, 2c awards a bank 1 point if the bank has explained the calculation method using the suggested approach of the Basel Accord II.

Investors feel easier to compare the change of operational risk capital reserves by giving time-variant data. Similar to the VaRDI that awards the bank which has presented inter-temporal data of VaR, the ORDI awards 1 point to the bank which has given the inter-temporal data of operational risk capital reserves (3a) no matter whether the report of the capital reserves is in the form of percentage or in the form of currency.

The ORDI awards the bank which has embedded the control of operational risk, legal risk or reputational risk into its governance structure. This is because if the controls of

operational risk, legal risk, and reputational risk are embedded into a bank's governance structure, the bank should have relevant professional teams specifically dealing with these risks, which gives the bank an extra strength in responding to these risks. 4a awards a bank 1 point if the bank has adopted the operational risk into its governance structure, 4b awards a bank 1 point if the bank has adopted the reputational risk into its governance structure, and 4c awards a bank 1 point if the bank has adopted the legal risk into its governance structure.

The category 5 of ORDI awards the bank which has explained the methodology in measuring the operational risk, legal risk or reputational risk. 5a, 5d, and 5e are related to the operational risk measurement. 5a awards a bank 1 point if the bank has reported the methodology for operational risk. 5d awards the bank 1 point if the bank has reported the data collection process for operational loss. 5e awards a bank 1 point if the bank has reported the internal reporting procedure for operational risk. Meanwhile, 5b is related to the reputational risk which awards a bank 1 point if the bank has reported the measurement methodology for reputational risk, and 5d is related to the legal risk which awards a bank 1 point if the bank has reported the measurement methodology for legal risk.

4.5 Data

4.5.1 Sample

This research chooses the world's top sixty banks as the sample to look at the risk information disclosures. The rank of the world's top sixty banks are based on their asset size at the end of 2013. The largest bank by asset size in 2013 is Industrial and Commercial Bank of China (ICBC) with a total asset of 3125.97 billion US dollars. The second largest bank by asset size in 2013 is HSBC with a total asset of 2617.32

billion US dollars. The third largest bank by asset size in 2013 is China Construction Bank with a total asset of 2538.62 billion US dollars. The total asset gap between the first largest and the second largest bank is nearly 500 billion US dollars which is very huge. The Cassa Depositi e Prestiti (CDP) is an Italian bank that the total asset of CDP is 470.19 billion US dollars at the end of 2013. Among the world's top sixty banks in the sample, the CDP is the smallest one by asset size. The average asset size of the world's top sixty banks in 2013 is around 1244.85 billion US dollars.

The world's top sixty banks[27] in 2013 are from a total of sixteen countries: Australia (4 banks), Brazil (1 bank), Canada (4 banks), China (12 banks), Denmark (1 bank), France (5 banks), Germany (4 banks), Italy (3 banks), Japan (5 banks), Netherlands (3 banks), Russia (1 bank), Spain (3 banks), Sweden (1 bank), Switzerland (2 banks), UK (5 banks) and USA (6 banks).

The electronical version of bank's public document appeared around the year 1996 with the time of internet popularization, and before the year 1996, only few documents were in electronical version. Therefore, the sample period of the current research starts from 1996 and lasts till 2013, which has covered nearly all available documents related to these banks.

4.5.2 Data Sources in Extracting the Risk Information Disclosures

Both indices – the value-at-risk disclosure index (VaRDI) and the operational risk disclosure index (ORDI) – extract data from banks' public documents. The current research has mainly fetched up the original public documents from three channels:

[27] Further information regarding the rank of the world's top banks can be traced through the website http://www.relbanks.com/worlds-top-banks/assets-2013.

- Bank official websites, which contain the original annual reports and the related crucial information.
- http://www.sec.gov/, which is the U.S. Securities and Exchange Commission official website. The database of this website contains 10-K[28], 10-Q[29] and 20-F[30] forms for American companies.
- https://bankscope.bvdinfo.com/, which is the database specially designated for the banking industry that contains the comprehensive information for 11,000 banks globally.

[28] The 10-K form is an annual comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information for the listed American company.
[29] The 10-Q form is a quarterly comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information for the listed American company.
[30] The 20-F form is a comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information for the listed foreign company.

4.6 The Disclosure Status of Market Risk Information

4.6.1 The Comprehensive Disclosure Status of VaRDI for the World's Top Sixty Banks in 2013

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Holding Period	Confidence Level	High, Low, Average	Year-End Var	Risk Category	Diversification	Previous Year	Histogram Daily VaR	Plot Daily Var	Hypothetical Revenue	No Trading Fees	Histogram Daily Rev.	Plot Daily Revenue	Exceptions	Explanation Exceptions	VaRDI
1	Industrial & Commercial Bank of China (ICBC)	China	3,125.97	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
2	HSBC Holdings	UK	2,617.32	1	1	1	1	1	0	1	0	2	0	0	1	0	2	0	11
3	China Construction Bank Corporation	China	2,538.62	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
4	BNP Paribas	France	2,486.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Mitsubishi UFJ Financial Group	Japan	2,462.90	1	1	1	1	0	0	0	0	2	0	0	0	0	0	0	6
6	JPMorgan Chase&Co	USA	2,415.69	1	1	1	1	1	1	1	0	2	0	0	0	2	1	0	12
7	Agricultural Bank of China	China	2,406.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Credit Agricole Group	France	2,356.45	1	1	1	1	1	1	1	0	2	0	0	0	0	1	0	10
9	Bank of China	China	2,292.59	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	6
10	Deutche Bank	Germany	2,225.35	1	1	1	1	1	1	1	0	2	1	0	1	1	1	1	14
11	Barclays PLC	UK	2,164.60	1	1	1	1	1	1	1	0	2	0	0	1	0	1	0	11
12	Bank of America	USA	2,102.27	1	1	1	1	1	1	1	0	2	0	0	1	1	2	0	13
13	Japan Post Bank	Japan	1,939.89	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	4
14	Citigroup Inc	USA	1,880.38	0	1	1	1	1	1	1	0	2	0	0	1	1	2	0	12
15	Mizuho Financial Group	Japan	1,794.54	1	1	1	1	1	0	1	0	2	0	0	0	0	1	0	9
16	Societe Generale	France	1,705.90	1	1	1	1	0	0	1	0	2	0	0	1	0	0	0	8
17	Royal Bank of Scotland Group	UK	1,695.50	1	1	1	1	1	1	1	0	2	0	0	0	2	1	1	13
18	Groupe BPCE	France	1,551.59	1	1	0	1	1	1	1	0	2	0	0	0	2	2	0	12
19	Banco Santander	Spain	1,540.70	1	1	1	1	1	1	1	1	1	1	0	0	2	1	1	14
20	Wells Fargo	USA	1,527.02	1	1	1	1	1	1	1	1	1	0	0	0	2	2	0	13
21	Sumitomo Mitsui Financial Group	Japan	1,497.16	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	7
22	Lloyds Banking Group	UK	1,397.19	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
23	China Development Bank	China	1,352.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	UniCredit S.p.A	Italy	1,168.11	1	1	1	1	0	0	1	0	2	1	0	0	2	2	0	12
25	UBS AG	Switzerland	1,138.26	1	1	1	1	1	1	1	0	2	0	1	1	1	0	0	12
26	ING Bank N.V.	Netherlands	1,087.63	1	1	1	1	1	1	1	0	2	1	1	0	2	2	0	15
27	Bank of Communications	China	984.99	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
28	Credit Suisse Group	Switzerland	983.78	1	1	1	1	1	1	1	0	2	0	0	1	0	1	0	11
29	Rabobank Group	Netherlands	983.99	1	1	1	1	1	1	0	0	2	0	0	0	0	0	0	8
30	Postal Savings Bank of China	China	922.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	Goldman Sachs Group	USA	911.51	1	1	1	1	1	1	1	0	2	0	0	1	0	0	0	10
32	Credit Mutuel Group	France	891.05	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3
33	Nordea Bank	Sweden	870.63	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
34	Intesa Sanpaolo	Italy	864.90	1	1	1	1	1	0	1	0	2	0	1	0	2	1	1	13
35	Morgan Stanley	USA	832.70	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	11
36	Norinchukin Bank	Japan	823.98	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3
37	Toronto-Dominion Bank	Canada	810.67	1	1	1	1	1	1	1	0	2	1	0	0	2	2	0	14
38	Royal Bank of Canada	Canada	808.66	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
39	BBVA	Spain	804.54	1	1	1	1	1	1	1	0	2	0	0	0	2	2	0	13
40	CommerzbankAG	Germany	759.09	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Holding Period	Confidence Level	High, Low, Average	Year-End Var	Risk Category	Diversification	Previous Year	Histogram Daily VaR	Plot Daily Var	Hypothetical Revenue	No Trading Fees	Histogram Daily Rev.	Plot Daily Revenue	Exceptions	Explanation Exceptions	VaRDI
41	National Australia Bank	Australia	772.39	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
42	Bank of Nova Scotia	Canada	698.72	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
43	Commenwealth Bank of Australia	Australia	697.80	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	6
44	Standard Charted Plc	UK	674.38	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	7
45	China Merchants Bank	China	663.67	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
46	KfW Group	Germany	641.89	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
47	Australia & Newzealand Banking Group	Australia	627.06	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
48	Westpac Banking Corp	Australia	625.37	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
49	Shanghai Pudong Development Bank	China	608.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Industrial Bank Co. Ltd	China	607.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	China CITIC Bank Corp	China	601.67	1	1	1	1	1	0	1	0	2	0	0	1	1	2	0	12
52	Danske Bank	Denmark	597.47	1	1	1	1	1	1	1	0	2	1	0	0	2	1	0	13
53	Sberbank Bank	Russia	557.18	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
54	Banco do Brazil SA	Brazil	552.67	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
55	DZ Bank AG	Germany	534.42	1	1	1	1	1	0	1	0	2	0	0	0	0	1	1	10
56	China Minsheng Banking Corp	China	533.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	ABN AMRO Group NV	Netherlands	513.77	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
58	Bank of Montreal	Canada	504.74	1	1	1	1	1	1	1	0	2	0	0	1	1	0	0	11
59	La Caixa Group	Spain	485.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Cassa Depositi e Prestiti(CDP)	Italy	470.19	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Table 4.1The Comprehensive Disclosure Status of VaRDI for the World's Top Sixty Banks in 2013

The VaRDI is an adopted index from Pérignon and Smith (2010) to measure the market risk information disclosure of banks. The VaRDI covers 6 facets of Value-at-Risk (VaR) disclosures including 15 individual components. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Var characteristics (1 point if holding period and 1 point if confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (1 point if high, low, average VaR, 1 point if year-end VaR, 1 point if risk category and 1 point if diversification). 3. Intertemporal comparison (1 point if previous year). 4. Daily VaR figures (1 point if there is a histogram of daily VaRs and 1 point if plotting daily VaRs in the meantime; or 1 point if there is a histogram of daily VaRs and 0 points if no plot of daily VaRs; or 0 points if no histogram of daily VaRs and 2 points if plotting daily VaRs). 5. Trading revenues (1 point if hypothetical trading revenue, 1 point if considering trading fees in hypothetical trading revenue, 1 point if there is a histogram of daily trading revenues and 1 point if plotting daily trading revenues in the meantime; or 1 point if there is a histogram of daily trading revenues and 0 points if no plot of daily trading revenues; or 0 points if no histogram of daily trading revenues and 2 points if plotting daily trading revenues). 6. Exceptions (1 point if stating the number of exceptions and 1 point if explaining the exceptions; or 2 points if no exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). The information about the rank of these banks at the end of 2013 can be traced through the website http://www.relbanks.com/worlds-top-banks/assets-2013.

Table 4.1 demonstrates the market risk information disclosure status for the world's top sixty banks in 2013. This market risk information disclosure is measured by the VaRDI which is a composite index designed by Pérignon and Smith (2010).

There are fifteen elements composing the VaRDI: holding period, confidence level, high low average of VaR, year-end VaR, risk category, diversification, previous year, histogram daily VaR, plot daily VaR, hypothetical revenue, no trading fees, histogram daily revenue, plot daily revenue, exceptions, and explanation exceptions. Section 4.3 has given a detailed explanation for all the fifteen elements. The highest score of VaRDI is 15 and the lowest score of VaRDI is 0. The disclosure rates for these fifteen VaRDI elements across all the banks in 2013 are 82% (holding period of VaR), 87% (confidence level of VaR), 73% (high low average of VaR), 75% (year-end VaR), 70% (risk category of VaR), 48% (diversification effect), 72% (previous year VaR), 5% (histogram daily VaR), 93% (plot daily VaR), 13% (hypothetical revenue), 7% (no trading fees), 23% (histogram daily revenue), 50% (plot daily revenue), 63% (exceptions) and 8% (explanation exceptions). Surprisingly, the highest disclosure rate among the fifteen elements is the plot of daily VaRs, which suggests that most banks have disclosed the plot depicting the change of VaRs. The holding period of VaR and the confidence level of VaR are two basic conditions of VaR. However, there are still banks not explicitly stating these two basic conditions, such that the disclosure rates of these two conditions are 82% and 87% respectively. For the banks which have disclosed these two conditions, the one-day holding period is used as the most common one for the time length of VaR, and the 99% confidence interval is used as the most common one for the confidence level of VaR. For other VaR descriptions such as high low average of VaR, year-end VaR, risk category of VaR and previous year VaR, the

disclosure rates are all above 70% but below 80%. Additionally, more than half of the banks have provided the back-testing information of VaR.

Only one bank among the top sixty has disclosed all VaRDI elements, which is the ING Bank in the Netherlands. There are five banks achieving fourteen points - only one point away from full disclosure of VaRDI. These banks are Deutsche bank (Germany), Banco Santander (Spain), Toronto-Dominion Bank (Canada), Royal Bank of Canada (Canada), and Bank of Nova Scotia (Canada). In the meantime, eight banks have not disclosed any information related to VaR. These banks are BNP Paribas (France), Agricultural Bank of China (China), China Development Bank (China), Postal Savings Bank of China (China), Shanghai Pudong Development Bank (China), Industrial Bank Co. Ltd (China), China Minsheng Banking Corporation (China), and La Caixa Group (Spain). The average score of VaRDI for the world's top sixty banks is 7.7.

4.6.2 VaRDI for the World's Top Sixty Banks in the Period 1996-2013

	Value at Risk Disclosure Index (VaRDI)		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	Median	Standard Error
1	Industrial & Commercial Bank of China (ICBC)	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	5	6	6	6	6	6	2.2	0.0	0.73
2	HSBC Holdings	UK	5	4	3	7	7	7	7	7	7	7	9	7	9	6	9	10	11	11	7.4	7.0	0.51
3	China Construction Bank Corporation	China	N/A	N/A	0	0	0	0	3	0	2	2	6	6	6	6	6	6	6	6	3.4	4.5	0.70
4	BNP Paribas	France	N/A	0	2	9	10	11	11	9	12	12	0	0	0	0	0	0	0	0	4.5	0.0	1.30
5	Mitsubishi UFL Financial Group	Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0.0	0.0	0.00
6	JPMorgan Chase&Co	USA	3	6	9	10	7	9	11	11	11	11	11	11	9	9	11	10	11	12	9.6	10.5	0.53
7	Agricultural Bank of China	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
8	Credit Agricole Group	France	N/A	N/A	2	2	2	5	7	6	6	7	7	10	10	11	10	10	10	10	7.2	7.0	0.79
9	Bank of China	China	N/A	N/A	0	0	0	0	0	0	0	0	6	7	6	6	6	6	6	6	3.1	3.0	0.79
10	Deutsche Bank	Germany	N/A	N/A	11	13	14	14	13	14	14	14	14	13	14	13	14	14	14	14	13.6	14.0	0.20
11	Barclays PLC	UK	5	7	8	9	11	11	11	12	11	12	12	9	11	11	11	11	11	11	10.2	11.0	0.45
12	Bank of America	USA	N/A	N/A	0	0	0	12	9	8	11	12	12	12	12	12	12	12	12	12	9.3	12.0	1.18
13	Japan Post Bank	Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	0	4	4	4	4	3.3	4.0	0.67
14	Citigroup Inc	USA	0	3	7	7	7	7	7	8	8	8	8	8	8	8	8	9	12	12	7.5	8.0	0.63
15	Mizuho Financial Group	Japan	N/A	N/A	N/A	N/A	N/A	4	5	7	7	8	9	10	10	10	10	9	9	9	8.2	9.0	0.54
16	Societe Generale	France	N/A	N/A	7	7	7	0	0	N/A	12	11	11	11	12	11	6	6	7	8	7.7	7.0	0.99
17	Royal Bank of Scotland Group	UK	N/A	N/A	5	7	7	7	7	7	7	8	10	7	9	9	10	11	10	13	8.4	7.5	0.51
18	Groupe BPCE	France	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12	12	2	5	12	8.6	12.0	2.14
19	Banco Santander	Spain	N/A	N/A	N/A	8	8	8	8	11	11	11	12	13	13	13	13	13	14	14	11.3	12.0	0.59
20	Wells Fargo	USA	N/A	N/A	0	0	0	2	2	2	3	3	3	3	3	3	3	3	12	13	3.4	3.0	0.93
21	Sumitomo Mitsui Financial Group	Japan	N/A	N/A	N/A	N/A	11	9	5	5	6	6	6	6	6	8	8	8	8	7	7.1	6.5	0.45
22	Lloyds Banking Group	UK	N/A	N/A	N/A	N/A	4	4	4	6	6	6	6	6	6	6	6	6	6	6	5.6	6.0	0.23
23	China Development Bank	China	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
24	UniCredit S.p.A	Italy	N/A	N/A	0	2	3	3	3	3	5	9	12	12	12	10	12	10	12	12	7.5	9.5	1.14
25	UBS AG	Switzerland	N/A	N/A	6	13	3	4	4	4	0	4	5	8	10	10	13	13	12	12	7.6	7.0	1.08
26	ING Bank N.V.	Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	7	0	7	13	13	13	13	13	13	13	15	15	11.3	13.0	1.27
27	Bank of Communications	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	0.7	0.0	0.47
28	Credit Suisse Group	Switzerland	N/A	N/A	0	0	12	12	12	13	12	13	12	12	12	12	12	12	11	11	10.5	12.0	1.03
29	Rabobank Group	Netherlands	N/A	N/A	N/A	3	2	1	1	1	8	8	8	8	8	8	8	8	8	8	5.9	8.0	0.82
30	Postal Savings Bank of China	China	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0.0	0.0	0.00
31	Goldman Sachs Group	USA	N/A	N/A	N/A	11	12	11	11	12	11	12	11	11	11	11	12	11	11	10	11.2	11.0	0.14
32	Credit Mutuel Group	France	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	2	3	0.8	0.0	0.54
33	Nordea Bank	Sweden	N/A	N/A	N/A	N/A	2	2	8	8	12	12	12	8	12	7	7	7	7	7	7.9	7.5	0.88
34	Intesa Sanpaolo	Italy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9	12	13	13	13	13	13	13	13	12.4	13.0	0.44
35	Morgan Stanley	USA	N/A	6	11	12	12	12	12	12	12	12	11	12	12	12	12	11	12	11	11.4	12.0	0.35

	Value at Risk Disclosure Index (VaRDI)		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	Median	Standard Error
36	Norinchukin Bank	Japan	N/A	N/A	5	2	5	5	5	5	4	4	5	5	4	4	4	3	3	3	4.1	4.0	0.24
37	Toronto-Dominion Bank	Canada	N/A	N/A	3	3	6	8	8	8	5	4	9	9	12	14	14	14	14	14	9.1	8.5	1.04
38	Royal Bank of Canada	Canada	N/A	N/A	7	9	13	13	14	14	14	14	14	14	14	14	14	12	12	14	12.9	14.0	0.52
39	BBVA	Spain	N/A	N/A	N/A	N/A	N/A	N/A	9	9	9	10	10	10	7	10	8	10	10	13	9.6	10.0	0.42
40	CommerzbankAG	Germany	4	4	5	5	5	7	10	12	8	8	6	6	5	6	10	6	6	6	6.6	6.0	0.52
41	National Australia Bank	Australia	3	3	4	4	4	5	6	7	7	7	7	7	7	7	7	7	7	7	5.9	7.0	0.37
42	Bank of Nova Scotia	Canada	N/A	3	6	6	4	5	12	10	11	12	12	14	14	14	12	13	14	14	10.4	12.0	0.95
43	Commenwealth Bank of Australia	Australia	N/A	N/A	0	2	9	6	6	6	6	6	6	6	6	6	6	6	6	6	5.6	6.0	0.49
44	Standard Charted Plc	UK	N/A	N/A	N/A	N/A	N/A	6	6	6	6	6	6	7	7	7	7	7	8	7	6.6	7.0	0.18
45	China Merchants Bank	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0.6	0.0	0.24
46	KfW Group	Germany	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1	0.0	0.09
47	Australia & Newzealand Banking Group	Australia	5	5	2	1	0	0	0	0	2	7	7	7	7	7	7	7	7	7	4.3	6.0	0.73
48	Westpac Banking Corp	Australia	0	0	0	0	0	0	0	9	9	9	9	9	7	7	7	7	7	7	4.8	7.0	0.95
49	Shanghai Pudong Development Bank	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
50	Industrial Bank Co. Ltd	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
51	China CITIC Bank Corp	China	N/A	N/A	0	0	0	0	0	0	0	0	5	6	6	11	12	12	12	12	4.8	2.5	1.34
52	Danske Bank	Denmark	N/A	0	0	4	6	4	5	4	4	5	3	10	13	13	13	13	13	13	7.2	5.0	1.19
53	Sberbank Bank	Russia	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	7	7	7	7	7	7	7	4.1	7.0	1.04
54	Banco do Brazil SA	Brazil	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.1	0.0	0.09
55	DZ Bank AG	Germany	N/A	N/A	N/A	N/A	N/A	8	8	7	6	6	6	8	6	8	8	10	10	10	7.8	8.0	0.43
56	China Minsheng Banking Corp	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
57	ABN AMRO Group NV	Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	6	6	2	5.0	6.0	1.00
58	Bank of Montreal	Canada	N/A	1	2	4	6	12	12	12	12	11	13	11	11	11	11	11	11	11	9.5	11.0	0.91
59	La Caixa Group	Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9	9	10	10	2	0	6.7	9.0	1.82
60	Cassa Depositi e Prestiti(CDP)	Italy	N/A	N/A	N/A	N/A	0	N/A	0	N/A	2	2	2	2	0	0	2	2	2	2	1.3	2.0	0.28

Table 4.2 VaRDI for the World's Top Sixty Banks during the Period 1996-2013

The table above is the summary of VaRDI for the world's top sixty banks during the period 1996-2013. The rank of these banks is based on the asset size of 2013. The original country and the asset size for each of these banks are shown alongside the bank's name. The average, median and standard error of VaRDI for each individual bank during the period 1996-2013 are shown at the end of each line. N/A stands for not available, in which the reasons might be no available document of the bank at that time, the bank was not existed at that time, etc. The VaRDI covers 6 facets of Value-at-Risk (VaR) disclosures including 15 individual elements. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Var characteristics (1 point if holding period and 1 point if confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (1 point if high, low, average VaR, 1 point if year-end VaR, 1 point if risk category and 1 point if diversification). 3. Intertemporal comparison (1 point if previous year). 4. Daily VaR figures (1 point if there is a histogram of daily VaRs and 1 point if plotting daily VaRs in the meantime; or 1 point if there is a histogram of daily VaRs and 0 points if no plot of daily VaRs; or 0 points if no histogram of daily VaRs and 2 points if plotting daily VaRs). 5. Trading revenues (1 point if hypothetical trading revenue, 1 point if considering trading fees in hypothetical trading revenue, 1 point if there is a histogram of daily trading revenues and 1 point if plotting daily trading revenues in the meantime; or 1 point if there is a histogram of daily trading revenues and 0 points if no plot of daily trading revenues; or 0 points if no histogram of daily trading revenues and 2 points if plotting daily trading

revenues). 6. Exceptions (1 point if stating the number of exceptions and 1 point if explaining the exceptions; or 2 points if no exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). The VaRDI is an adopted index from Pérignon and Smith (2010) which measures the market risk disclosures.

Table 4.2 tabulates the scores of VaRDI for the world's top sixty banks during the period 1996-2013. Due to data limitation, the score of VaRDI is not available for several banks in certain years. There are mainly two reasons for this data limitation, which are that either the annual report is not in English or the annual report is not available online. Moreover, the restructuring[31] within the banking industry has caused additional data imbalance.

Based on the existing data for the period 1996-2013, Deutsche Bank (Germany) has the highest average score of VaRDI which is 13.6. The average score of VaRDI for the sample is above ten and there are several banks disclosing relatively high amounts of information related to VaR, these banks are JPMorgan Chase & Co (USA), Barclays PLC (UK), Banco Santander (Spain), ING Bank N.V. (Netherlands), Credit Suisse Group (Switzerland), Goldman Sachs Group (USA), Intesa Sanpaolo (Italy), Morgan Stanley (USA), Royal Bank of Canada (Canada), and Bank of Nova Scotia (Canada). In the meantime, there are several banks disclosing no, or nearly no, information related to VaR such that the average score of VaRDI is close to zero. These banks are Agricultural Bank of China (China), China Development Bank (China), Postal Savings Bank of China (China), KfW Group (Germany), Shanghai Pudong Development Bank (China), Industrial Bank Co. Ltd (China), Banco do Brazil SA (Brazil), and China Minsheng Banking Corp (China).

[31] Mitsubishi UFL Financial Group is a Japanese bank which was the product of the merger between the Bank of Tokyo-Mitsubishi and UFJ Group in 2006. Many European banks had also been restructured after the 2008 financial crisis by merger or by acquisition, such as Credit Mutuel Group (France) and ABN ARMO Group NV (Netherlands).

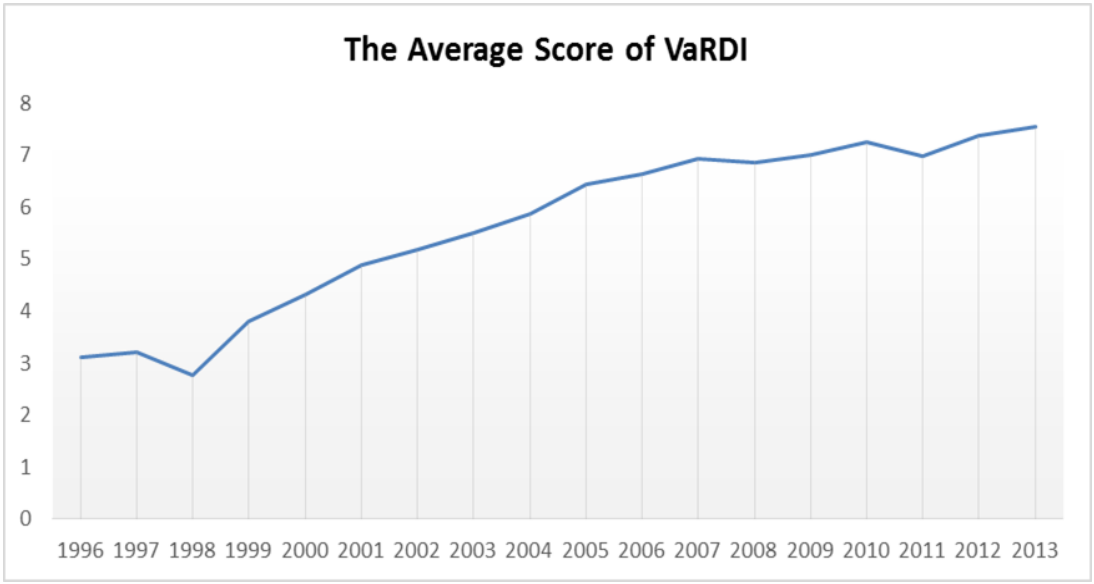


Figure 4.2 The Average Score Trend of VaRDI during the Period 1996-2013

The figure above plots the average scores of VaRDI across all the sixty banks during the period 1996-2013. These sixty banks are the world's largest sixty banks ranked by asset size in 2013. The data panel is unbalanced.

As shown in the figure above, there is an upward trend for the average scores of VaRDI for the world's top sixty banks across the period 1996-2013. The average score of VaRDI for the world's top sixty banks is only 3.1 in 1996, whilst the average score of VaRDI for the world's top sixty banks increases to 7.7 in 2013.

4.6.3 VaRDI for the Country Average during the Period 1996-2013

Table 4.3 tabulates the scores for the country average VaRDI based on the world's top sixty banks during the period 1996-2013. The world's top sixty banks are from sixteen countries. During the period 1996-2013, although there is rise and fall, the average score of VaRDI has generally increased for every country.

During the period 1996-2013, in terms of the average score of VaRDI, Brazil and China have relatively low values which are 0.13 and 1.23 respectively. Canada has the highest value which is 10.16. Spain, Switzerland and the USA have relatively high values followed by Canada which are 9.66, 9.03 and 8.30 respectively.

Country	Number of Banks in the Top 60 (2013)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
Australia	4	2.67	2.67	1.50	1.75	3.25	2.75	3.00	5.50	6.00	7.25	7.25	7.25	6.75	6.75	6.75	6.75	6.75	6.75	5.07
Brazil	1	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.13
Canada	4	N/A	2.00	4.00	5.50	7.25	9.50	11.50	11.00	10.50	10.25	12.00	12.00	12.75	13.25	12.75	12.50	12.75	13.25	10.16
China	12	N/A	N/A	0.00	0.00	0.00	0.00	0.25	0.00	0.17	0.17	1.42	1.58	1.92	2.58	2.67	2.67	3.08	3.17	1.23
Denmark	1	N/A	0.00	0.00	4.00	6.00	4.00	5.00	4.00	4.00	5.00	3.00	10.00	13.00	13.00	13.00	13.00	13.00	13.00	7.24
France	5	N/A	0.00	2.00	5.50	6.00	8.00	9.00	7.50	8.75	8.75	6.75	7.75	6.00	6.80	5.60	3.60	4.80	6.60	6.08
Germany	4	4.00	4.00	5.33	6.00	6.33	7.25	7.75	8.25	7.00	7.00	6.50	6.75	6.25	6.75	8.00	7.50	7.75	7.75	6.68
Italy	3	N/A	N/A	0.00	2.00	3.00	3.00	1.50	3.00	3.50	6.67	8.67	9.00	8.33	7.67	9.00	8.33	9.00	9.00	5.73
Japan	5	N/A	N/A	5.00	2.00	8.00	6.00	5.00	5.67	5.67	6.00	5.00	5.25	4.80	4.40	5.20	4.80	4.80	4.60	5.14
Netherlands	3	N/A	N/A	N/A	3.00	2.00	1.00	4.00	0.50	7.50	10.50	10.50	10.50	10.50	10.50	9.00	9.00	9.67	8.33	7.10
Russia	1	N/A	N/A	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	4.08
Spain	3	N/A	N/A	N/A	8.00	8.00	8.00	8.50	10.00	10.00	10.50	11.00	11.50	9.67	10.67	10.33	11.00	8.67	9.00	9.66
Sweden	1	N/A	N/A	N/A	N/A	2.00	2.00	8.00	8.00	12.00	12.00	12.00	8.00	12.00	7.00	7.00	7.00	7.00	7.00	7.93
Switzerland	2	N/A	N/A	3.00	6.50	7.50	8.00	8.00	8.50	6.00	8.50	8.50	10.00	11.00	11.00	12.50	12.50	11.50	11.50	9.03
UK	5	5.00	5.50	5.33	7.67	7.25	7.00	7.00	7.60	7.40	7.80	8.60	7.20	8.40	7.80	8.60	9.00	9.20	9.60	7.55
USA	6	1.50	5.00	5.00	6.67	6.33	8.83	8.67	8.83	9.33	9.67	9.33	9.50	9.17	9.17	9.67	9.33	11.67	11.67	8.30

Table 4.3 VaRDI for the Country Average during the Period 1996-2013

The table above is the summary of VaRDI for the country average based on the world's top sixty banks (by the asset size of 2013) during the period 1996-2013. The number of banks for each country within the top sixty banks is also shown in the table. The average value of VaRDI for each country within the period 1996-2013 is shown at the end of each line. The VaRDI covers 6 facets of Value-at-Risk (VaR) disclosures including 15 individual elements. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Var characteristics (1 point if holding period and 1 point if confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (1 point if high, low, average VaR, 1 point if year-end VaR, 1 point if risk category and 1 point if diversification). 3. Intertemporal comparison (1 point if previous year). 4. Daily VaR figures (1 point if there is a histogram of daily VaRs and 1 point if plotting daily VaRs in the meantime; or 1 point if there is a histogram of daily VaRs and 0 points if no plot of daily VaRs; or 0 points if no histogram of daily VaRs and 2 points if plotting daily VaRs). 5. Trading revenues (1 point if hypothetical trading revenue, 1 point if considering trading fees in hypothetical trading revenue, 1 point if there is a histogram of daily trading revenues and 1 point if plotting daily trading revenues in the meantime; or 1 point if there is a histogram of daily trading revenues and 0 points if no plot of daily trading revenues; or 0 points if no histogram of daily trading revenues and 2 points if plotting daily trading revenues). 6. Exceptions (1 point if stating the number of exceptions and 1 point if explaining the exceptions; or 2 points if no exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). The VaRDI is an adopted index from Pérignon and Smith (2010) which measures the market risk disclosure.

4.7 The Disclosure Status of Operational Risk Information

4.7.1 The Comprehensive Disclosure Status of ORDI for the World's Top Sixty Banks in 2013

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Operational Risk	Reputation Risk	Legal Risk	Portion Risk Capital (1:%, 2: $)	Caculation Method	Previous Year	Operational Governance Structure	Reputation Governance Structure	Legal Governance Structure	Operational Measurement	Reputation Measurement	Legal Measurement	Data Collection Process	Operational Reporting Procedures	ORDI
1	Industrial & Commercial Bank of China (ICBC)	China	3,125.97	1	0	1	0	0	0	1	0	1	1	0	1	0	0	6
2	HSBC Holdings	UK	2,617.32	1	1	1	2	0	1	1	1	1	1	1	1	1	1	14
3	China Construction Bank Corporation	China	2,538.62	1	1	1	0	0	0	1	1	1	1	1	0	1	1	10
4	BNP Paribas	France	2,486.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Mitsubishi UFJ Financial Group	Japan	2,462.90	1	1	1	0	0	0	1	0	0	1	1	0	1	1	8
6	JPMorgan Chase&Co	USA	2,415.69	1	1	1	0	0	0	1	1	1	1	1	1	1	1	11
7	Agricultural Bank of China	China	2,406.24	1	1	1	2	1	0	1	0	0	1	1	1	1	1	12
8	Credit Agricole Group	France	2,356.45	1	0	1	2	1	1	1	0	0	1	0	1	1	1	11
9	Bank of China	China	2,292.59	1	0	0	0	1	0	1	0	0	1	0	0	1	1	6
10	Deutche Bank	Germany	2,225.35	1	0	1	2	1	1	1	0	0	1	0	0	1	1	10
11	Barclays PLC	UK	2,164.60	1	1	1	2	1	1	1	1	0	1	0	1	1	1	13
12	Bank of America	USA	2,102.27	1	0	1	0	1	0	1	0	0	1	0	0	0	1	6
13	Japan Post Bank	Japan	1,939.89	1	1	1	2	1	1	1	0	0	1	0	0	1	1	11
14	Citigroup Inc	USA	1,880.38	1	0	1	0	1	0	1	0	0	1	0	1	0	1	7
15	Mizuho Financial Group	Japan	1,794.54	1	1	1	2	1	1	1	0	0	1	1	1	1	1	13
16	Societe Generale	France	1,705.90	1	1	1	2	1	1	1	0	1	1	1	1	1	1	14
17	Royal Bank of Scotland Group	UK	1,695.50	1	1	1	2	1	1	1	1	0	1	1	0	1	1	13
18	Groupe BPCE	France	1,551.59	1	0	1	2	1	1	1	0	1	1	0	1	1	1	12
19	Banco Santander	Spain	1,540.70	1	1	0	0	0	0	1	1	0	1	1	0	1	1	8
20	Wells Fargo	USA	1,527.02	1	1	1	0	0	0	1	1	0	1	0	0	0	0	6
21	Sumitomo Mitsui Financial Group	Japan	1,497.16	1	0	0	0	1	0	1	0	0	1	0	0	0	0	4
22	Lloyds Banking Group	UK	1,397.19	1	0	0	2	1	1	1	0	0	1	0	0	1	1	9
23	China Development Bank	China	1,352.99	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
24	UniCredit S.p.A	Italy	1,168.11	1	1	1	1	1	1	1	0	0	1	1	1	1	1	12
25	UBS AG	Switzerland	1,138.26	1	0	1	2	1	1	1	0	0	1	0	0	1	1	10
26	ING Bank N.V.	Netherlands	1,087.63	1	1	1	2	1	1	1	1	0	1	0	0	1	1	12
27	Bank of Communications	China	984.99	1	0	1	0	0	0	1	0	0	1	0	0	0	1	5
28	Credit Suisse Group	Switzerland	983.78	1	1	1	2	1	1	1	1	0	1	1	0	1	1	13
29	Rabobank Group	Netherlands	983.99	1	1	1	0	1	0	1	0	0	1	0	0	0	1	7
30	Postal Savings Bank of China	China	922.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	Goldman Sachs Group	USA	911.51	1	1	1	0	1	0	1	1	0	1	0	0	1	1	9
32	Credit Mutuel Group	France	891.05	1	1	1	0	1	0	0	0	0	1	1	1	1	1	9
33	Nordea Bank	Sweden	870.63	1	0	0	2	1	1	1	0	0	1	0	0	1	1	9
34	Intesa Sanpaolo	Italy	864.90	1	1	1	2	1	1	1	0	0	1	1	1	1	1	13
35	Morgan Stanley	USA	832.70	1	1	1	0	1	0	1	0	0	1	0	1	1	0	8
36	Norinchukin Bank	Japan	823.98	1	1	1	2	1	1	1	0	0	1	0	1	1	1	12
37	Toronto-Dominion Bank	Canada	810.67	1	1	1	2	1	1	1	1	1	1	1	1	0	1	14
38	Royal Bank of Canada	Canada	808.66	1	1	1	2	1	1	1	1	1	1	1	1	1	1	15
39	BBVA	Spain	804.54	1	1	1	0	1	0	1	0	0	1	1	0	1	0	8
40	CommerzbankAG	Germany	759.09	1	1	1	2	1	1	1	1	0	1	1	1	1	0	13

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Operational Risk	Reputation Risk	Legal Risk	Portion Risk Capital (1:%, 2: $)	Caculation Method	Previous Year	Operational Governance Structure	Reputation Governance Structure	Legal Governance Structure	Operational Measurement	Reputation Measurement	Legal Measurement	Data Collection Process	Operational Reporting Procedures	ORDI
41	National Australia Bank	Australia	772.39	1	1	0	2	0	1	1	0	0	1	0	0	0	0	7
42	Bank of Nova Scotia	Canada	698.72	1	1	1	2	1	0	1	1	0	1	1	0	1	0	11
43	Commenwealth Bank of Australia	Australia	697.80	1	1	0	2	1	1	1	0	0	1	0	0	0	0	8
44	Standard Charted Plc	UK	674.38	1	1	1	2	1	1	1	1	0	1	1	0	0	0	11
45	China Merchants Bank	China	663.67	1	1	1	2	1	1	1	1	1	1	1	0	0	0	12
46	KfW Group	Germany	641.89	1	1	1	2	1	1	1	0	0	1	1	1	1	0	12
47	Australia & Newzealand Banking Group	Australia	627.06	1	1	1	2	1	1	1	1	0	1	0	0	0	1	11
48	Westpac Banking Corp	Australia	625.37	1	1	1	2	1	1	1	1	0	1	0	0	0	1	11
49	Shanghai Pudong Development Bank	China	608.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Industrial Bank Co. Ltd	China	607.66	1	1	0	0	0	0	1	0	0	1	1	0	0	0	5
51	China CITIC Bank Corp	China	601.67	1	1	1	2	1	0	1	0	0	1	1	1	1	0	11
52	Danske Bank	Denmark	597.47	1	0	0	2	1	1	1	0	0	0	0	0	0	0	6
53	Sberbank Bank	Russia	557.18	1	0	0	0	0	0	1	0	0	1	0	0	0	1	4
54	Banco do Brazil SA	Brazil	552.67	1	0	0	0	1	0	1	0	0	0	0	0	0	0	3
55	DZ Bank AG	Germany	534.42	1	1	1	2	1	1	1	1	1	1	1	1	1	1	15
56	China Minsheng Banking Corp	China	533.10	1	1	0	2	1	0	1	1	0	1	1	0	0	1	10
57	ABN AMRO Group NV	Netherlands	513.77	1	1	1	2	1	1	1	1	1	1	0	0	0	1	12
58	Bank of Montreal	Canada	504.74	1	1	0	2	1	1	1	1	0	1	1	0	1	1	12
59	La Caixa Group	Spain	485.11	1	1	1	0	1	0	1	1	0	1	1	0	1	1	10
60	Cassa Depositi e Prestiti(CDP)	Italy	470.19	1	0	1	0	0	0	1	0	0	1	0	0	1	1	6

Table 4.4 The Comprehensive Disclosure Status of ORDI for the World's Top Sixty Banks in 2013

This is a table that tabulates the scores for ORDI and the composite elements of ORDI for the world's top sixty banks in 2013. The ORDI is an adopted index from Goyal and Wu (2007) which measures the operational risk disclosure. The ORDI covers 5 facets of operational risk disclosures including 14 individual components. The ORDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Recognition and definition of operational risk (1 point if recognition and definition of operational risk as a risk exposure, 1 point if recognition and definition of reputational risk as a risk exposure and 1 point if recognition and definition of legal risk as a risk exposure). 2. Operational risk capital (1 point if operational risk capital is reported in percentage terms or 2 points if operational risk capital is reported in currency terms, and 1 point if the calculation method of operational risk capital is explained under Basel II). 3. Intertemporal comparison (1 point if operational risk capital is reported for previous years). 4. Governance (1 point if operational risk responsibility is adopted into the governance structure, 1 point if reputational risk responsibility is adopted into the governance structure and 1 point if legal risk responsibility is adopted into the governance structure). 5. Methodology/reporting (1 point if operational risk measurement or assessment methodology, 1 point if reputational risk measurement or assessment methodology, 1 point if legal risk measurement or assessment methodology, 1 point if operational loss data collection process and 1 point if operational risk internal reporting procedures. The theoretical score of ORDI ranges from 0 (minimum) to 15 (maximum). The information about the rank of these banks at the end of 2013 can be traced from the website http://www.relbanks.com/worlds-top-banks/assets-2013.

Table 4.4 demonstrates the operational risk information disclosure status for the world's top sixty banks in 2013. This operational risk information disclosure status is measured by the ORDI which is a composite index originally designed by Goyal and Wu (2007).

There are fourteen elements composing the ORDI: operational risk, reputation risk, legal risk, risk capital, calculation method, previous year risk capital, operational governance structure, reputation governance structure, legal governance structure, operational measurement, reputation measurement, legal measurement, data collection process, and operational reporting procedures. Section 4.4 has given a detailed explanation for all the fourteen elements. The highest score of ORDI is 15 and the lowest score of ORDI is 0. The disclosure rates for these fourteen ORDI elements are 95% (operational risk), 67% (reputation risk), 72% (legal risk), 58% (risk capital), 73% (calculation method), 52% (previous year risk capital), 92% (operational governance structure), 38% (reputation governance structure), 18% (legal governance structure), 92% (operational measurement), 45% (reputation measurement), 35% (legal measurement), 60% (data collection process), and 67% (operational reporting procedures).

Five banks out of the top sixty have disclosed all the ORDI elements, which are HSBC Holdings (UK), Societe Generale (France), Toronto-Dominion Bank (Canada), Royal Bank Canada (Canada), and DZ Bank AG (Germany). Among the five banks, Royal Bank of Canada (Canada) and DZ Bank AG (Germany) have 15 points in the ORDI and the others have 14 points in the ORDI, since Royal Bank of Canada (Canada) and DZ Bank AG (Germany) have reported the risk capital in the form of currency and the

others have reported the risk capital in the form of percentage[32]. In the meantime, three banks have disclosed nothing under the elements of ORDI, these three banks are BNP Paribas (France), Postal Savings Bank of China (China), and Shanghai Pudong Development Bank (China). The average score of ORDI for the world's top sixty banks is 9.2.

[32] The operational risk capital can be reported in two forms, which are either in the form of percentage or in the form of currency. If the operational risk capital is reported in the form of percentage, the ORDI will award the bank 1 point. If the operational risk capital is reported in the form of currency, the ORDI will award the bank 2 points.

4.7.2 ORDI for the World's Top Sixty Banks in the Period 1996-2013

	Operational Risk Disclosure Index (ORDI)		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	Median	Standard Error
1	Industrial & Commercial Bank of China (ICBC)	China	N/A	N/A	0	0	0	0	1	1	2	3	3	3	3	3	6	6	6	6	2.7	3.0	0.58
2	HSBC Holdings	UK	0	0	0	0	2	5	5	7	7	7	10	4	11	7	13	15	14	14	6.7	7.0	1.23
3	China Construction Bank Corporation	China	N/A	N/A	0	2	3	4	4	4	4	5	5	5	5	5	7	8	10	10	5.1	5.0	0.66
4	BNP Paribas	France	N/A	0	3	4	6	8	9	8	8	10	5	2	4	2	2	0	0	0	4.2	4.0	0.84
5	Mitsubishi UFJ Financial Group	Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	8	8	8	8	8	8	8	7.4	8.0	0.63
6	JPMorgan Chase&Co	USA	0	0	0	2	3	6	8	11	10	13	12	12	12	12	12	12	14	11	8.3	11.0	1.19
7	Agricultural Bank of China	China	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	2	4	4	5	6	8	9	9	12	5.9	5.5	1.15
8	Credit Agricole Group	France	N/A	N/A	0	0	1	4	5	7	8	9	9	10	11	11	10	10	10	11	7.3	9.0	1.00
9	Bank of China	China	N/A	N/A	0	0	0	2	2	2	4	4	5	4	4	6	7	7	6	6	3.7	4.0	0.61
10	Deutsche Bank	Germany	N/A	N/A	8	3	7	7	9	7	7	8	9	9	9	10	10	10	10	10	8.3	9.0	0.46
11	Barclays PLC	UK	2	4	4	5	6	5	6	6	2	11	11	11	11	12	11	12	12	13	8.0	8.5	0.91
12	Bank of America	USA	N/A	N/A	0	0	0	2	4	3	3	4	3	4	4	5	6	6	6	6	3.5	4.0	0.53
13	Japan Post Bank	Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9	10	11	11	11	11	10.5	11.0	0.34
14	Citigroup Inc	USA	0	2	0	0	0	0	2	4	5	11	11	8	6	6	6	7	8	7	4.6	5.5	0.89
15	Mizuho Financial Group	Japan	N/A	N/A	N/A	N/A	N/A	4	4	6	5	7	7	7	13	13	13	13	13	13	9.1	7.0	1.08
16	Societe Generale	France	N/A	N/A	2	3	3	5	4	N/A	6	7	9	9	9	10	14	13	14	14	8.1	9.0	1.10
17	Royal Bank of Scotland Group	UK	N/A	N/A	2	2	2	1	3	4	4	4	4	4	10	12	12	12	13	13	6.4	4.0	1.16
18	Groupe BPCE	France	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11	12	12	12	12	11.8	12.0	0.20
19	Banco Santander	Spain	N/A	N/A	N/A	2	4	2	4	10	9	11	10	10	9	9	8	8	8	8	7.5	8.0	0.77
20	Wells Fargo	USA	N/A	N/A	0	0	0	0	0	1	1	0	1	1	1	3	4	5	6	6	1.8	1.0	0.56
21	Sumitomo Mitsui Financial Group	Japan	N/A	N/A	N/A	N/A	2	2	1	5	7	7	10	11	10	7	7	7	6	4	6.1	7.0	0.82
22	Lloyds Banking Group	UK	N/A	N/A	N/A	N/A	2	2	3	4	3	6	7	6	9	9	9	9	9	9	6.2	6.5	0.77
23	China Development Bank	China	N/A	N/A	N/A	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2.0	0.00
24	UniCredit S.p.A	Italy	N/A	N/A	1	1	1	1	1	4	5	6	8	9	9	12	12	12	12	12	6.6	7.0	1.17
25	UBS AG	Switzerland	N/A	N/A	4	3	4	4	7	8	8	8	6	6	9	9	9	9	9	10	7.1	8.0	0.57
26	ING Bank N.V.	Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	6	4	7	11	12	10	12	12	12	7.7	8.5	1.25
27	Bank of Communications	China	N/A	N/A	0	0	0	0	1	3	3	3	3	3	2	2	5	5	5	5	2.5	3.0	0.47
28	Credit Suisse Group	Switzerland	N/A	N/A	5	5	5	5	4	6	6	11	14	13	13	13	13	13	13	13	9.5	12.0	1.01
29	Rabobank Group	Netherlands	N/A	N/A	N/A	4	3	3	3	3	4	6	5	5	6	7	8	8	8	7	5.3	5.0	0.50
30	Postal Savings Bank of China	China	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0.0	0.0	0.00
31	Goldman Sachs Group	USA	N/A	N/A	N/A	4	4	4	5	7	7	7	8	8	10	9	10	9	9	9	7.3	8.0	0.56
32	Credit Mutuel Group	France	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	9	8	9	10	9	8.8	9.0	0.31
33	Nordea Bank	Sweden	N/A	N/A	N/A	N/A	4	5	6	6	6	6	7	9	11	9	9	9	9	9	7.5	8.0	0.54
34	Intesa Sanpaolo	Italy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	7	9	11	12	13	13	13	13	10.9	12.0	0.86
35	Morgan Stanley	USA	N/A	4	4	4	5	5	6	6	5	6	7	7	11	8	7	7	8	8	6.4	6.0	0.45

Operational Risk Disclosure Index (ORDI)			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	Median	Standard Error
36	Norinchukin Bank	Japan	N/A	N/A	1	1	1	1	1	2	4	5	5	9	11	11	12	12	12	12	6.3	5.0	1.21
37	Toronto-Dominion Bank	Canada	N/A	N/A	2	2	2	3	4	4	10	11	11	11	13	14	14	14	14	14	8.9	11.0	1.27
38	Royal Bank of Canada	Canada	N/A	N/A	2	2	2	2	7	7	7	9	15	15	14	15	15	15	15	15	9.8	11.5	1.41
39	BBVA	Spain	N/A	N/A	N/A	N/A	N/A	N/A	4	6	7	7	7	9	9	10	9	12	7	8	7.9	7.5	0.60
40	CommerzbankAG	Germany	0	0	0	7	8	9	9	14	15	15	15	11	12	13	8	8	8	13	9.2	9.0	1.18
41	National Australia Bank	Australia	3	3	3	3	3	3	3	3	3	4	9	7	7	6	6	7	6	7	4.8	3.5	0.48
42	Bank of Nova Scotia	Canada	N/A	4	2	2	3	3	4	9	8	9	9	9	11	11	11	11	11	11	7.5	9.0	0.87
43	Commenwealth Bank of Australia	Australia	N/A	N/A	2	3	5	4	4	4	5	4	4	4	7	7	7	7	8	8	5.2	4.5	0.47
44	Standard Charted Plc	UK	N/A	N/A	N/A	N/A	N/A	1	1	2	2	2	3	7	10	11	11	11	11	11	6.4	7.0	1.26
45	China Merchants Bank	China	N/A	N/A	0	0	0	0	0	0	0	0	3	2	0	8	9	10	10	12	3.4	0.0	1.15
46	KfW Group	Germany	N/A	N/A	0	0	0	3	4	4	5	6	6	7	7	8	10	11	11	12	5.9	6.0	0.99
47	Australia & Newzealand Banking Group	Australia	3	3	3	3	3	3	3	3	3	3	5	5	7	9	11	11	11	11	5.6	3.0	0.81
48	Westpac Banking Corp	Australia	1	3	3	3	3	3	4	4	7	7	7	8	8	8	8	8	8	11	5.8	7.0	0.65
49	Shanghai Pudong Development Bank	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.00
50	Industrial Bank Co. Ltd	China	N/A	N/A	0	0	0	0	0	0	0	2	1	2	3	3	3	3	5	5	1.7	1.5	0.45
51	China CITIC Bank Corp	China	N/A	N/A	0	0	1	2	3	4	7	7	7	10	11	11	11	12	12	11	6.8	7.0	1.13
52	Danske Bank	Denmark	N/A	N/A	0	2	4	6	6	7	8	6	1	6	6	7	7	6	6	6	5.3	6.0	0.57
53	Sberbank Bank	Russia	N/A	N/A	N/A	N/A	N/A	N/A	0	1	1	2	2	3	3	3	3	3	3	4	2.3	3.0	0.33
54	Banco do Brazil SA	Brazil	N/A	N/A	0	0	0	0	0	1	1	1	2	2	2	2	2	2	2	3	1.3	1.5	0.25
55	DZ Bank AG	Germany	N/A	N/A	N/A	N/A	N/A	4	5	8	9	9	10	10	9	13	13	13	13	15	10.1	10.0	0.91
56	China Minsheng Banking Corp	China	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	10	1.4	0.0	0.77
57	ABN AMRO Group NV	Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	11	12	12	11.3	11.5	0.48
58	Bank of Montreal	Canada	N/A	2	3	3	3	6	5	5	9	7	7	7	9	10	12	12	12	12	7.3	7.0	0.85
59	La Caixa Group	Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	6	6	9	9	10	7.8	8.0	0.70
60	Cassa Depositi e Prestiti(CDP)	Italy	N/A	N/A	N/A	N/A	0	N/A	0	N/A	0	0	3	3	3	3	3	4	6	6	2.6	3.0	0.63

Table 4.5 ORDI for the World's Top Sixty Banks during the Period 1996-2013

The table above is the summary of ORDI for the world's top sixty banks during the period 1996-2013. The rank of the banks is based on the asset size of 2013. The original country and the asset size for each of the banks are shown alongside the bank's name. The average, median and standard error of ORDI for the period 1996-2013 of each individual bank are shown at the end of each line. N/A stands for not available, which the reasons might be no available documents of the bank at that time, the bank was not existed at that time, etc. The ORDI covers 5 facets of operational risk disclosures including 14 individual components. The ORDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Recognition and definition of operational risk (1 point if recognition and definition of operational risk as a risk exposure, 1 point if recognition and definition of reputational risk as a risk exposure and 1 point if recognition and definition of legal risk as a risk exposure). 2. Operational risk capital (1 point if operational risk capital is reported in percentage terms or 2 points if operational risk capital is reported in currency terms, and 1 point if the calculation method of operational risk capital is explained under Basel II). 3. Intertemporal comparison (1 point if operational risk capital is reported for previous years). 4. Governance (1 point if operational risk responsibility is adopted into the governance structure, 1 point if reputational risk responsibility is adopted into the governance structure and 1 point if legal risk responsibility is adopted into the governance structure). 5. Methodology/reporting (1 point if operational risk measurement or assessment methodology, 1 point if reputational risk measurement or assessment methodology, 1 point if legal risk measurement or assessment methodology, 1 point if operational loss data collection process and 1 point if operational risk internal reporting

procedures. The theoretical score of ORDI ranges from 0 (minimum) to 15 (maximum). The ORDI is an adopted index from Goyal and Wu (2007) which measures the operational risk disclosure.

Table 4.5 tabulates the scores of ORDI for the world's top sixty banks during the period 1996-2013. Due to data limitation, the score of ORDI is not available for several banks in certain years. There are mainly two reasons for this data limitation, which are either the annual report is not in English or the annual report is not available online. Moreover, the restructuring[33] within the banking industry causes additional data imbalance.

Based on the existing data during the period 1996-2013, ABN AMRO Group NV (Netherlands) has the highest average score of ORDI which is 11.3. Besides ABN AMRO Group NV, there are several banks disclosing relatively high amounts of information about operational risks that the scores of ORDI for these banks are above ten, they are Japan Post Bank (Japan), Societe Generale (France), Groupe BPCE (France), Intesa Sanpaolo (Italy), CommerzbankAG (Germany), and DZ Bank AG (Germany). In the meantime, there is one bank disclosing no information about operational risks which is Shanghai Pudong Development Bank (China).

[33] Mitsubishi UFL Financial Group is a Japanese bank which is merged by the Bank of Tokyo-Mitsubishi and UFJ Group in 2006. A lot of European banks have also been restructured after the 2008 financial crisis by merger or by acquisition, such as Credit Mutuel Group (France) and ABN ARMO Group NV (Netherlands).

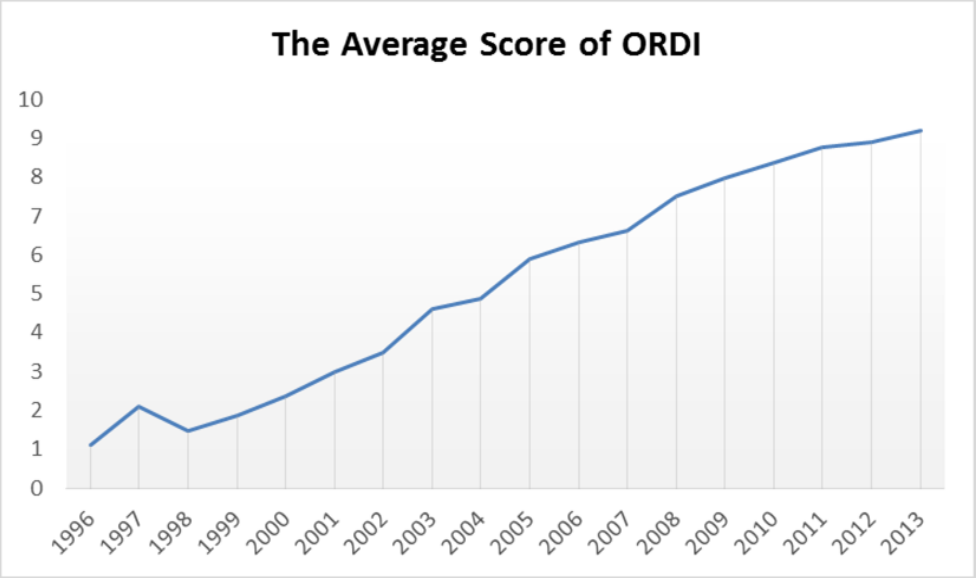


Figure 4.3 The Average Score Trend of ORDI during the Period 1996-2013

This figure above plots the average scores of ORDI across all the sixty banks during the period 1996-2013. These sixty banks are the world's largest sixty banks ranked by asset size in 2013. The data panel is unbalanced.

As shown in the figure above, there is an upward trend for the average scores of ORDI for the world's top sixty banks across the period 1996-2013. The average score of ORDI for the world's top sixty banks is only 1.1 in 1996, whilst the average score of ORDI for the world's top sixty banks increases to 9.2 in 2013.

4.7.3 ORDI for the Country Average during the Period 1996-2013

Table 4.6 tabulates the scores for the country average of ORDI based on the world's top sixty banks during the period 1996-2013. The world's top sixty banks ranked by the asset size of 2013 are from a total of sixteen countries. During the period 1996-2013, although there is rise and fall, the average score of ORDI has increased for every country.

During the period 1996-2013, in terms of the average score of ORDI, Brazil, China and Russia have relatively low values which are 1.25, 2.61 and 2.33 respectively.

Switzerland has the highest value which is 8.28. Canada and Germany have relatively high values that followed by Canada which are 8.22 and 7.42 respectively.

Country	Number of Banks in the Top 60 (2013)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
Australia	4	2.33	3.00	2.00	2.25	3.00	2.75	3.25	3.50	4.50	4.50	6.25	6.00	7.25	7.50	8.00	8.25	8.25	9.25	5.10
Brazil	1	N/A	N/A	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	1.25
Canada	4	N/A	3.00	2.50	2.25	2.50	3.50	5.00	6.25	8.50	9.00	10.50	10.50	11.75	12.50	13.00	13.00	13.00	13.00	8.22
China	12	N/A	N/A	0.00	0.17	0.33	0.67	0.92	1.17	1.67	2.17	2.58	2.75	2.75	3.83	4.83	5.67	5.75	6.58	2.61
Denmark	1	N/A	N/A	0.00	2.00	4.00	6.00	6.00	7.00	8.00	6.00	1.00	6.00	6.00	7.00	7.00	6.00	6.00	6.00	5.25
France	5	N/A	0.00	1.50	2.00	3.50	6.00	7.00	7.50	7.25	8.50	7.75	7.50	8.80	8.60	9.20	8.80	9.20	9.20	6.61
Germany	4	0.00	0.00	2.67	3.33	5.00	5.75	6.75	8.25	9.00	9.50	10.00	9.25	9.25	11.00	10.25	10.50	10.50	12.50	7.42
Italy	3	N/A	N/A	1.00	1.00	1.00	1.00	0.50	4.00	2.50	4.33	6.00	7.00	7.67	9.00	9.33	9.67	10.33	10.33	5.29
Japan	5	N/A	N/A	1.00	1.00	1.50	2.33	2.00	4.33	5.33	6.33	6.25	8.75	10.20	9.80	10.20	10.20	10.00	9.60	6.18
Netherlands	3	N/A	N/A	N/A	4.00	3.00	3.00	2.50	2.50	3.00	6.00	4.50	6.00	8.50	9.50	9.33	10.33	10.67	10.33	6.21
Russia	1	N/A	N/A	N/A	N/A	N/A	N/A	0.00	1.00	1.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	2.33
Spain	3	N/A	N/A	N/A	2.00	4.00	2.00	4.00	8.00	8.00	9.00	8.50	9.50	8.33	8.33	7.67	9.67	8.00	8.67	7.04
Sweden	1	N/A	N/A	N/A	N/A	4.00	5.00	6.00	6.00	6.00	6.00	7.00	9.00	11.00	9.00	9.00	9.00	9.00	9.00	7.50
Switzerland	2	N/A	N/A	4.50	4.00	4.50	4.50	5.50	7.00	7.00	9.50	10.00	9.50	11.00	11.00	11.00	11.00	11.00	11.50	8.28
UK	5	1.00	2.00	2.00	2.33	3.00	2.80	3.60	4.60	3.60	6.00	7.00	6.40	10.20	10.20	11.20	11.80	11.80	12.00	6.20
USA	6	0.00	2.00	1.00	1.67	2.00	2.83	4.17	5.33	5.17	6.83	7.00	6.67	7.33	7.17	7.50	7.67	8.50	7.83	5.04

Table 4.6 ORDI for the Country Average based on the World's Top Sixty Banks during the Period 1996-2013

The table above is the summary of ORDI for the country average based on the world's top sixty banks (by the asset size of 2013) during the period 1996-2013. The number of banks for each country is also shown in the table. The average value of ORDI for each country within the period 1996-2013 is shown at the end of each line. The ORDI covers 5 facets of operational risk disclosures including 14 individual components. The ORDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Recognition and definition of operational risk (1 point if recognition and definition of operational risk as a risk exposure, 1 point if recognition and definition of reputational risk as a risk exposure and 1 point if recognition and definition of legal risk as a risk exposure). 2. Operational risk capital (1 point if operational risk capital is reported in percentage terms or 2 points if operational risk capital is reported in currency terms, and 1 point if the calculation method of operational risk capital is explained under Basel II). 3. Intertemporal comparison (1 point if operational risk capital is reported for previous years). 4. Governance (1 point if operational risk responsibility is adopted into the governance structure, 1 point if reputational risk responsibility is adopted into the governance structure and 1 point if legal risk responsibility is adopted into the governance structure). 5. Methodology/reporting (1 point if operational risk measurement or assessment methodology, 1 point if reputational risk measurement or assessment methodology, 1 point if legal risk measurement or assessment methodology, 1 point if operational loss data collection process and 1 point if operational risk internal reporting procedures. The theoretical score of ORDI ranges from 0 (minimum) to 15 (maximum). The ORDI is an adopted index from Goyal and Wu (2007) which measures the operational risk disclosure.

4.8 A Comparison Work in Terms of the Status of Risk Information Disclosures with Pérignon and Smith (2010)

Using data sampled annually from 1996 to 2005, Perigon and Smith (2010) examine the level and quality of market risk disclosures for the world's top fifty banks measured by asset size. There exist differences in the level of market risk disclosures among the world's top banks in 2005, and the data over the period 1996-2005 has shown a general increase in the level of market risk disclosures for the world's top banks. In particular, banks in Netherlands and Spain stand out for their high transparency and high-quality reporting of VaR information. In addition, Pérignon and Smith (2010) compare the market risk disclosures by American banks with the banks from other countries such as Germany, France, UK, Canada, Japan, etc., which shows that although American banks have not a significant difference in the level of market risk disclosures from other countries, American banks are more reluctant to report sensitive and in-depth information about market risks compared with other countries. Especially, the level of market risk disclosures in American banks is considerably lower compared with nearby Canadian banks.

After 2005, the global economy was severely shaken by the 2008 financial crisis derived from the US. As a result of the crisis, several top banks around the world went through takeover or reorganization [34] . Meanwhile, the rapid expansion and liberalisation of Chinese economy has triggered the emergence of several Chinese

[34] After the US government intervention, Wachovia (USA) was acquired by Wells Fargo in 2008. Due to the trading loss made in 2008, Caisse Nationale d. Caisses (France) merged with Banque fédérale des banques populaires in July 2009 to become Groupe BPCE. After encountering the financial problem in 2008, Fortis Bank NV/SA (Belgium) was sold its ownership to BNP Paribas in 2010. Calyon (France) was dissolved in 2008 and rebranded as Crédit Agricole Corporate and Investment Bank in 2010. Dresdner Bank Group (Germany) was acquired by Commerzbank in December 2009.

banks into the list of the world's top banks[35]. Therefore, it is worthwhile to take a further look in comparing the difference of risk information disclosures between the sample in the current research and the sample in Pérignon and Smith (2010).

4.8.1 The Disclosure Indices and the Sample in the Comparison Research

In order to generate comparable results, this comparison research employs the same metric quantifying the VaR disclosures as Perigon and Smith (2010). This metric is the composite index VaRDI capturing six facets of Value-at-Risk disclosures. The score of VaRDI ranges from the minimum 0 to the maximum 15. The detailed explanation of VaRDI can be found in section 4.3 or in Perigon and Smith (2010).

In addition to using the VaRDI, this comparison research also acquires the composite index ORDI to further facilitate the comparison. The ORDI is the operational risk disclosure index designed by Goyal and Wu (2007). The detailed explanation of ORDI can be found in section 4.4 or in Goyal and Wu (2007).

In Pérignon and Smith (2010), the sample consists of fifty world's top commercial banks measured by asset size in 2005. Unlike the sample period in the study of Pérignon and Smith (2010), when it was relatively straightforward to distinguish a bank as an investment bank or a commercial bank, it is hard to do so nowadays with the emergence of the universal intermediary structure for large banking institutions. The intermediary structure is a mixed structure in banking businesses which may include both the retail and commercial banking business and the investment banking

[35] In 2005, there are four Chinese banks within the world's top fifty banks which are Industrial and Commercial Bank of China (ranked 20th in 2005), Agriculture Bank of China (ranked 24th in 2005), Bank of China (ranked 33rd in 2005), and China Construction Bank (ranked 37th in 2005). In 2013, Industrial and Commercial Bank of China has jumped to the top of the rank as the largest bank in the world, and the other three banks have also increased their world rank to 7th, 9th, and 3rd respectively. At the end of 2013, besides these four Chinese banks, there are six other Chinese banks in the world's top fifty which are China Development Bank (ranked 23rd in 2013), Bank of Communications (ranked 27th in 2013), Postal Savings Bank of China (ranked 30th in 2013), Shanghai Pudong Development Bank (ranked 49th in 2013), and Industrial Bank Co. Ltd (ranked 50th in 2013).

business within a single enterprise. The world's renowned banks like Citi Group, HSBC, Deutsche Bank, Royal Bank of Scotland, Wells Fargo, etc. are under the intermediary structure and do not limit their scope of activities to retail banking services, offering further services such as life assurance, retirement planning, and fund management. In reality, it is relatively unusual to observe large banking institutions that are focussed solely on traditional banking activities such as saving and lending. The mixed business in the banking industry is still a developing trend. Therefore, this comparison research has sampled both commercial and investment banks. Moreover, in order to produce a relatively comprehensive picture, this comparison research has slightly increased the sample size of the world's banks to sixty instead of the sample size of fifty in Pérignon and Smith (2010). Again, the rank of the top banks is based on bank's asset size at the end of 2013[36]. With the intention to give comparable results with Pérignon and Smith (2010) for the American banking industry and the Canadian banking industry, besides the world's top sixty banks in 2013, Wachovia, U.S. Bank, Sun Trust, Key Bank, State Street, Bank of Nova Scotia, Bank of Montreal, CIBC and National Bank of Canada are added into the sample. Overall speaking, the sample collected under this comparison research contains approximately 80% of the banks in the sample of Pérignon and Smith (2010).

4.8.2 The US Sample and the Evolution of VaR Disclosures in the US

Pérignon and Smith (2010) have a special focus on the VaR disclosures for the American banking industry. Therefore, this section will present a comparable analysis with Pérignon and Smith (2010) on the VaR disclosures for the American banking industry over the period 2006-2013.

[36] Further information with regard to the rank of the world's top banks can be traced through the website http://www.relbanks.com/.

There were ten American banks shown in Pérignon and Smith (2010), namely Bank of America, JPMorgan Chase, Citigroup, Wachovia, Wells Fargo, U.S. Bank, Sun Trust, HSBC Bank, Key Bank and State Street. In contrast, the sample of world's top sixty banks in 2013 contains six American banks, namely JPMorgan Chase, Bank of America, Citigroup, Wells Fargo, Goldman Sachs Group and Morgan Stanley.

Pérignon and Smith (2010) regard HSBC as an American bank. This comparison research has noticed that HSBC originated in the British former colony Hong Kong and now is being headquartered in London. Therefore, the current research regards HSBC as a British bank instead of an American bank.

Among the world's top sixty banks in 2013, JPMorgan Chase, Bank of America, Citigroup and Wells Fargo are American banks and have appeared in the sample of Pérignon and Smith (2010). Goldman Sachs Group and Morgan Stanley are solely investment banks which Pérignon and Smith (2010) have excluded but included in the current research. The intention to only look at the commercial banking sector like the previous research did is not realistic, since JPMorgan Chase, Bank of America, Citigroup and Wells Fargo have all well involved in the investment business nowadays. The line between the investment bank and the commercial bank is blurred as banks around the world developed mixed businesses for their portfolios. For example, one of the American banks Wells Fargo used to be a traditional commercial bank but now generates a significant proportion of revenues from the investment banking business[37].

In addition to the six American banks within the world's top sixty of 2013, this comparison research has added another five American banks into the US sample which

[37] In 2009, Wells Fargo set up a division Wells Fargo Securities with a special focus on the investment banking business. The investment banking division has approximately 4,500 employees and generates revenue between $3 and $4 billion per year for Wells Fargo.

are not in the top sixty of 2013 but in the sample of Pérignon and Smith (2010). These five American banks are Wachovia, U.S. Bank, Sun Trust, Key Bank and State Street. In the period 2006-2007, the US sample by the current research consists of 11 banks which are JPMorgan Chase, Bank of America, Citigroup, Wells Fargo, Goldman Sachs Group, Morgan Stanley, Wachovia, U.S. Bank, Sun Trust, Key Bank and State Street. Wachovia was acquired by Wells Fargo[38] in 2008, thus from 2008 onwards, the US sample in the current research has cut out Wachovia.

The table below is the summary statistics for the status of VaR disclosures for the top American banks within the period 2006-2013. Panel A of the table tabulates average VaRDI, standard deviation of VaRDI, and minimum and maximum VaRDI among these American banks for the period 2006-2013. Panel B of the table tabulates the disclosure ratios for the elements of VaR holding period, VaR confidence level, high low and average VaR, year-end VaR, risk category of VaR, diversification effect of VaR, previous year VaR, histogram daily VaR, plot daily VaR, hypothetical trading revenue, no trading fees, histogram of daily trading revenue, plot of daily trading revenue, exceptions, and explanation of exceptions among these American banks for the period 2006-2013.

[38] Due to the heavy loss of the subprime mortgage crisis, Wachovia was acquired by Wells Fargo in 2008, and consequently Wachovia was delisted from the stock market in 2008. Therefore, there are no available documents for Wachovia after 2008 and the VaRDI is not able to be composited for Wachovia after 2008.

VaR disclosure of US banks (10+1)	2006	2007	2008	2009	2010	2011	2012	2013
Panel A								
Average VaRDI	8.1	8.2	7.6	7.6	7.9	7.6	9.1	9.2
Standard Deviation VaRDI	3.6	3.7	3.5	3.5	3.8	3.4	3.4	3.4
Minimum VaRDI	3.0	3.0	3.0	3.0	3.0	3.0	4.0	4.0
Maximum VaRDI	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Panel B								
Holding Period	91%	91%	90%	90%	90%	80%	80%	80%
Confidence Level	100%	100%	100%	100%	100%	100%	100%	100%
High, Low, Average VaR	91%	91%	90%	90%	90%	100%	100%	100%
Year-End VaR	82%	82%	80%	80%	80%	80%	90%	100%
Risk Category	64%	64%	60%	60%	60%	60%	80%	80%
Diversification	55%	55%	60%	60%	60%	60%	70%	70%
Previous Year	82%	82%	90%	90%	90%	90%	90%	100%
Histogram Daily VaR	18%	18%	20%	20%	20%	20%	30%	20%
Plot Daily VaR	27%	27%	20%	20%	20%	20%	40%	50%
Hypothetical Trading Revenue	0%	0%	0%	0%	0%	0%	0%	0%
No Trading Fees	10%	10%	10%	10%	10%	10%	10%	10%
Histogram Daily Trading Revenue	55%	55%	50%	50%	50%	50%	50%	40%
Plot Daily Trading Revenue	19%	19%	10%	10%	10%	10%	30%	40%
Exceptions	45%	45%	40%	40%	50%	50%	50%	50%
Explanation of Exceptions	0%	27%	20%	10%	0%	10%	0%	0%

Table 4.7 VaR Disclosure of Top US Banks (10+1) during the Period 2006-2013

This table presents the summary statistics about the VaR disclosures among the top banks in the US for the period 2006-2013. This is a comparison table with table 1 in Pérignon and Smith (2010). Therefore, the sample consists of similar banks in the previous research. Meanwhile, the sample has adjusted the sample by considering the sample change in 2008 due to the acquisition of Wachovia by Wells Fargo. In the period 2006-2007, the sample consists of 11 banks which are JPMorgan Chase, Bank of America, Citigroup, Wells Fargo, Goldman Sachs Group, Morgan Stanley, Wachovia, U.S. Bank, Sun Trust, Key Bank and State Street. From 2008 onwards, the sample has cut out Wachovia since Wachovia was acquired by Wells Fargo in 2008. The VaR disclosure index (VaRDI) is adopted from Periogon and Smith (2010) which measures 6 features of Value-at-Risk Disclosure. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. VaR characteristics (holding period and confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (high low average VaR, year-end VaR, risk category and diversification). 3. Intertemporal comparison (previous year). 4. Daily VaR figures (histogram of daily VaRs and plot of daily VaRs). 5. Trading revenues (hypothetical trading revenue, no trading fees in revenue, histogram of daily trading revenues and plot of daily trading revenues). 6. Exceptions (number of exceptions and explanation of exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). The table consists of two panels. Panel A is about the summary scores of VaRDI which includes average VaRDI, standard deviation of VaRDI, and minimum and maximum VaRDI. Panel B is about the percentage ratios exhibiting the percentage rates for banks releasing each component, e.g. the percentage ratio 10% shown in the table indicates that 1 out of 10 banks releasing the corresponding component.

VaR disclosure of top 10 US banks.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Average VaRDI	0.4	1.8	4.0	4.1	4.9	6.3	6.7	6.5	7.0	7.0
Standard-Deviation VaRDI	1.3	2.9	3.2	3.0	3.4	4.2	3.8	3.5	3.7	3.7
Minimum VaRDI	0	0	0	0	0	0	2	2	2	2
Maximum VaRDI	4	8	9	8	10	12	12	12	13	13
Holding Period	10	40	70	70	70	80	90	90	90	90
Confidence Level	0	40	70	80	80	90	100	100	100	100
High, Low, Average VaR	0	0	40	40	50	50	60	60	80	80
Year-End VaR	0	10	50	50	60	60	70	70	80	80
Risk Category	0	20	40	40	50	60	60	60	60	60
Diversification	0	20	50	30	40	50	40	40	40	40
Previous Year	0	0	40	60	60	50	60	60	60	60
Histogram Daily VaR	0	0	10	10	10	10	10	0	0	0
Plot Daily VaR	0	0	0	0	10	20	20	20	20	20
Hypothetical Trading Revenue	0	0	0	0	0	0	0	0	0	0
No Trading Fees	0	0	0	0	0	0	0	0	0	0
Histogram Daily Trading Revenue	10	10	10	10	20	40	40	50	50	50
Plot Daily Trading Revenue	0	0	0	0	10	20	20	20	20	20
Exceptions	10	20	20	10	10	40	40	40	40	40
Explanation of Exceptions	0	0	0	0	0	30	0	0	0	0

Notes: This table presents some summary statistics about the VaR Disclosure Index (VaRDI) and the percentage of US sample banks that disclose each index component entering into the VaRDI, e.g. a value of 10 means 10% or one bank. VaRDI covers six components of VaR disclosure: (1) VaR Characteristics: score of 1 if Holding Period (e.g. 1 day, 1 month), score of 1 if Confidence Level (e.g. 99%, 95%), (2) Summarized VaR Statistics: score of 1 if High, Low, or Average, score of 1 if Year-End Value, score of 1 if VaR by Risk Category, and score of 1 if Diversification Effect, (3) Intertemporal Comparison: score of 1 if Summarized Information from Previous Year, (4) Daily VaR Figures: score of 1 if Histogram of Daily VaRs, or score of 2 if Plot of Daily VaRs, (5) Trading Revenues: score of 1 if Hypothetical Revenues, score of 1 if Revenues without Trading Fees, score of 1 if Histogram of Daily Revenues, or score of 2 if Plot of Daily Revenues, and (6) Exceptions: score of 1 if Number of Exceptions, or score of 2 if zero exceptions), and score of 1 if Explanation of Exceptions. The range for VaRDI is 0 (minimum)–15 (maximum).

Table 4.8 VaR Disclosure of Top Ten American Banks during the Period 1996-2005

Source: Pérignon and Smith (2010)

This table is extracted from Pérignon and Smith (2010). Table 4.7 is the comparison table with this one.

The American banks in the sample of Pérignon and Smith (2010) and the American banks in the current research are more or less similar. In combination, table 4.7 and table 4.8 exhibit the status of VaR disclosures among these American banks during the period 1996-2013. The average score of VaRDI for these American banks is 0.4 in 1996, while the average score of VaRDI for these American banks increases to 9.2 in 2013. From 1996 to 2013, there is an increase of 8.8 points in the average score of VaRDI among these banks. This is consistent with the statement in Pérignon and Smith (2010) that there is an upward trend towards VaR disclosures amongst American banks. The sample of Pérignon and Smith (2010) ends in 2005 when the average score of VaRDI for these banks is 7.0. The new sample ends in 2013 when the average score of VaRDI for these banks is 9.2. Compared to 2005, the average score of VaRDI among these banks has increased 2.2 points in 2013. Though the increase of the average score of VaRDI during the period 2006-2013 demonstrates an improvement

in VaR disclosures among American banks, the t-test suggests that the increase of the average score of VaRDI during the period 1996-2005 is significantly larger than the increase of the average score of VaRDI during the period 2006-2013 among these banks. Moreover, the average score of VaRDI for these banks slightly decreases within the period 2007-2008, which coincides with the time frame of the financial crisis. By 2012, the average score of VaRDI for these banks rebounds to 9.1, which is the score level before the financial crisis.

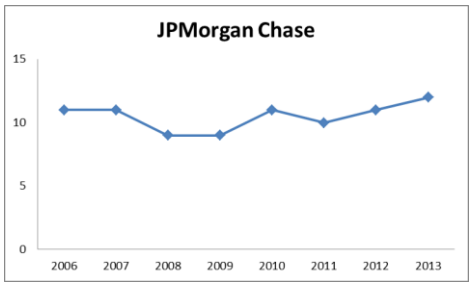
The standard deviation of the scores of VaRDI among these American banks in each year ranges from 3.4 to 3.8. The score difference between the maximum and minimum score of VaRDI among these banks is 11 in 2005, while the score difference between the maximum and minimum of VaRDI among these banks is 9 in 2013. As before in the period 1996-2005, the difference for the disclosures of VaR information remains among these banks during the period 2006-2013. JP Morgan Chase and Bank of America have relatively high average scores of VaRDI in the period 2006-2013. U.S. Bank and Sun Trust have relatively low average scores of VaRDI in the period 2006-2013. Pérignon and Smith (2010) believe that the difference in the disclosures of VaR information is related to bank's size and bank's involvement in trading activities.

Panel B of table 4.7 presents the percentage ratios of VaRDI components among these American banks, which this part can be compared to the corresponding part of table 4.8 in Pérignon and Smith (2010). With the exception of two components as yet unreported by any top American bank in 2013, generally speaking, there is an overall upward trend in each component. The first unreported component is hypothetical trading revenue which has not been reported by any top American bank through the period 2006-2013. Pérignon and Smith (2010) also find this lack reporting in hypothetical trading revenue among these banks through the period 1996-2005. The

absence of hypothetical trading revenue brings obstacles for investors evaluating the potential gain of investment and comparing with the potential maximum loss indicated by VaR. Another unreported component is the explanation of exceptions, which is rarely reported by any top American bank through the period 2006-2013. In 2007, 2008, 2009 and 2011, there are 27%, 20%, 10% and 10% of these banks explaining the VaR violations respectively. In the rest years of the period 2006-2013, the percentage ratio of reporting the explanation of exceptions among these banks is 0%. Wachovia used to explain the VaR violations in 2007, after the merger with Wells Fargo in 2008, only Bank of America, and Morgan Stanley provide the explanation of exceptions in 2008. In 2009, only Morgan Stanley provides the explanation of VaR violations. Citi provides the explanation of VaR violations in 2011.

Another relatively weak point in the VaR disclosure among these banks is around the issue of reporting daily VaR figures. In 2013, the percentage ratios for the disclosures of daily VaR histogram and daily VaR plot are 20% and 50% respectively. Although this is weak, when compared to the percentage ratios in 2005 which are 0% and 20% respectively, it still illustrates an upward trend in the disclosure of VaR figures among these banks.

In terms of more basic information disclosures about VaR such as VaR characteristics, summarized VaR characteristics and intertemporal comparison of VaR, the disclosure levels are relatively high among these banks. Especially the sections like confidence level, high low average VaR, year-end VaR, and previous year VaR, all banks have reported them in 2013. In contrast, the percentage ratios for the disclosures of high low average VaR, year-end VaR, and previous year VaR in 2005 among these banks are 80%, 80%, and 60% respectively.


JPMorgan Chase
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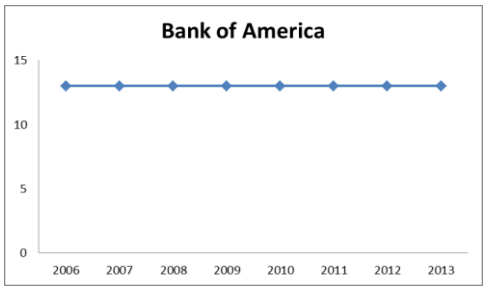
Bank of America
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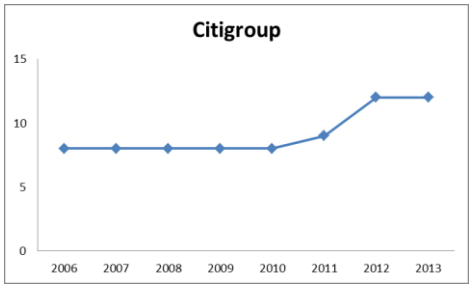
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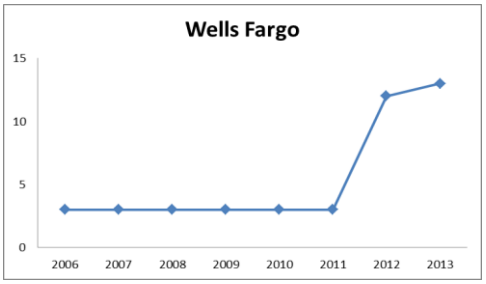
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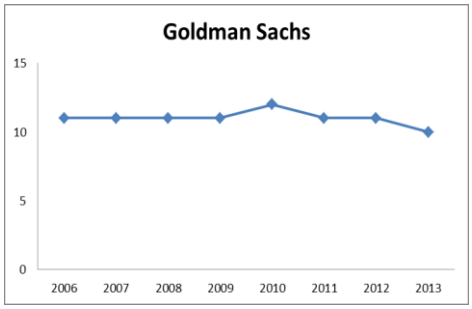
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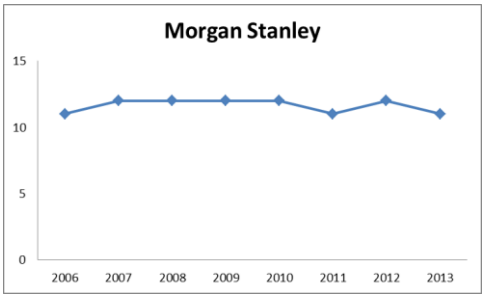
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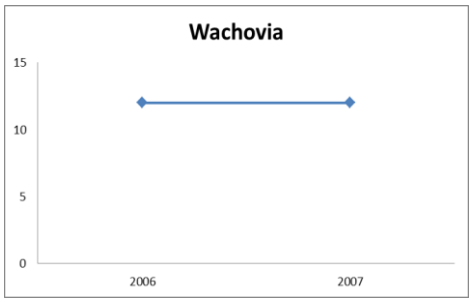
Wachovia
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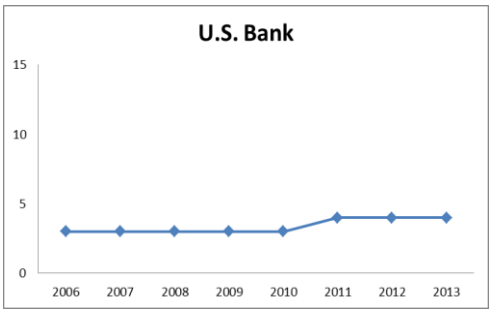
2006
2007


U.S. Bank
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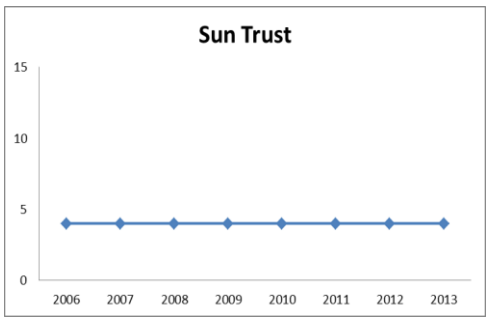
2006 2007 2008 2009 2010 2011 2012 2013


Sun Trust
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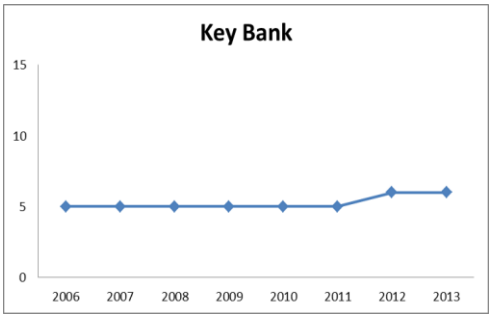
Key Bank
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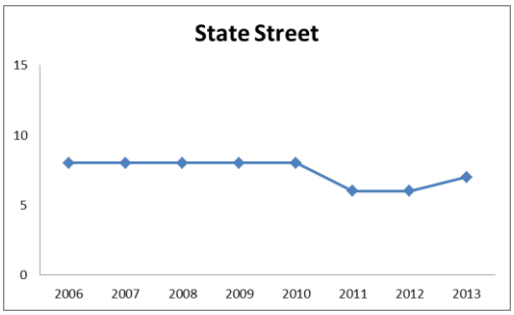

Figure 4.4 VaR Disclosure Index Plot for 11 Top American Banks during the Period 2006-2013

The figures above plot the VaR disclosure index (VaRDI) for 11 top banks in the US during the period 2006-2013. Wachovia has been acquired by Wells Fargo in 2008, thus the plot for Wachovia only covers the period 2006-2007.

A disaggregated view of VaR disclosures across these eleven top American banks is shown in figure 4.4, which provides a comparison to figure 1 in Pérignon and Smith (2010). Among these eleven banks, JPMorgan Chase, Citigroup, Wells Fargo, U.S. Bank and Key Bank have shown increased scores of VaRDI in 2013 compared to 2006. Especially, Wells Fargo has a dramatic increase in the score of VaRDI in 2012, which is the biggest increase among these banks during the period 2006-2013. The disclosure status in other banks remains relatively stable during this period. Bank of America and Sun Trust have not shown any change in their scores of VaRDI such that the VaRDI plots of these two banks are flat during this period.

The relatively large banks in the sample such as JPMorgan Chase, Bank of America and Citigroup exhibit constant higher scores of VaRDI during this period. On the other hand, the relatively small banks such as U.S. Bank, Sun Trust and Key bank exhibit constant lower scores of VaRDI during this period. The difference between the minimum and maximum score of VaRDI in 2006 is 10 points, and in 2013 the difference between the minimum and maximum score of VaRDI only subsides by 1 point which means the gap of VaR disclosures still remains among these American banks.

4.8.3 A Comparison of the VaR Disclosure between the US and Canada

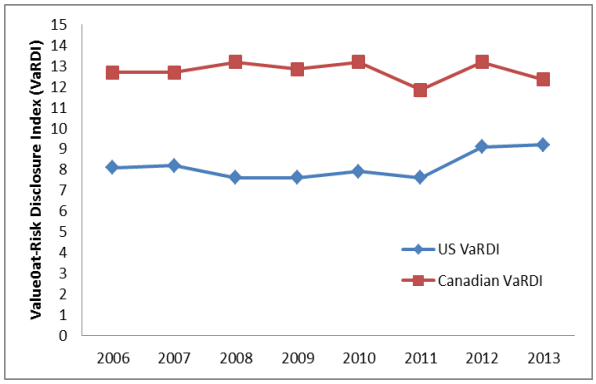

Figure 4.5 VaR Disclosure Index Plot in the US and in Canada during the Period 2006-2013

The figure is based on the average scores of the Value-at-Risk Disclosure Index (VaRDI) for 11 American banks and 6 Canadian banks within the period 2006-2013. The 11 banks composing the US sample are JPMorgan Chase, Bank of America, Citigroup, Wells Fargo, Goldman Sachs Group, Morgan Stanley, Wachovia, U.S. Bank, Sun Trust, Key Bank and State Street. Wachovia has been cut out from the sample in 2008 and afterwards, since it has been acquired by Wells Fargo in 2008. The 6 banks composing the Canadian sample are Toronto-Dominion Bank, Royal Bank of Canada, Bank of Nova Scotia, Bank of Montreal, CIBC, and National Bank of Canada.

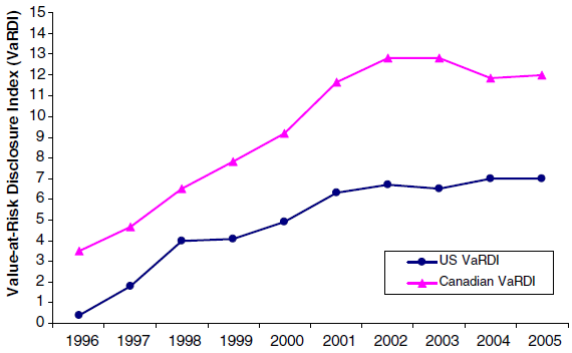

Figure 4.6 VaRDI Plot in the US and Canada during the Period 1996-2005

Source: Pérignon and Smith (2010)

This figure is extracted from Pérignon and Smith (2010). The two plots exhibit the average scores of the Value-at-Risk Disclosure Index (VaRDI) in the US and Canada within the period 1996-2005. The US sample contains 10 banks which are Bank of America, JPMorgan Chase, Citigroup, Wachovia, Wells Fargo, U.S. Bank, Sun Trust, HSBC Bank, Key Bank and State Street. The Canadian sample contains 6 banks which are Royal Bank of Canada, Toronto-Dominion Bank, Bank of Nova Scotia, Bank of Montreal, CIBC, and National Bank of Canada.

The Canadian sample is composed of the exact same Canadian banks in Pérignon and Smith (2010). Compared to 2005, in 2013 Toronto Dominion Bank has replaced Royal Bank of Canada as the biggest bank in Canada.

The average scores of VaRDI for these top American banks and these top Canadian banks during the period 2006-2013 are depicted in figure 4.5. Figure 4.6 is the comparison one for the period 1996-2005 extracted from Pérignon and Smith (2010). Figure 4.6 shows an incremental trend in VaR disclosures for both the US and Canada over the period 1996-2005, while figure 4.5 illustrates a relatively stable trend of VaR disclosures for both the US and Canada over the period 2006-2013. Canada maintains a high rate of VaR disclosures through the period 2006-2013 and there is a limited upside increase for Canada, as the average score of VaRDI in Canada has already been very high in 2005. The stable trend of VaR disclosures in Canada not only exists within the period 2006-2013, in figure 4.6, if we look at the section from 2002 onwards, that part of the figure also manifests a stable trend of VaR disclosures. The most significant increase of VaR disclosures for the US and Canada is in the period 1996-2002, in which both figures demonstrate a noticeable upward increase. There are only mere changes in the average scores of VaRDI for these two developed economies after 2002.

The gap of VaR disclosures between American banks and Canadian banks still remains that Canadian banks generally have a higher rate of VaR disclosures than American banks. Pérignon and Smith (2010) believe that there are mainly two reasons for the higher disclosure of VaR information in Canada, one is the peculiar competition among Canadian banks, and the other is that American banks are mainly exposed to credit risk while Canadian banks are mainly exposed to currency risk.

Barth et al. (2001) show that in 1999, the top ten banks in the US accounted for only 21% of US deposits, while the top six banks in Canada held 76% of Canadian deposits. The banking industry is more concentrated in Canada compared to the US, which creates a high incentive for Canadian banks not to deviate from the industry norm of a higher market risk disclosure. Alternatively, the high concentration of deposits attracts

the attention of financial regulators in Canada to monitor the safety of the banking industry, which could be the potential reason for the higher market risk disclosure in Canada.

4.8.4 The International Sample and the VaR Disclosure in the World

Besides looking at the VaR disclosure in the US and Canada specifically, Pérignon and Smith (2010) also take a look at the VaR disclosure in the world using a sample consisting of the world's top fifty banks (by the asset size) in 2005. This research has slightly increased the number of world banks from fifty to sixty, by doing so this research concludes more world banks than Pérignon and Smith (2010). In 2013, the world's top sixty banks have more Chinese banks when comparing to the sample collected in Pérignon and Smith (2010). Due to bankruptcies and reorganizations, several banks in the top fifty at the time of Pérignon and Smith (2010) have no longer existed or been crowded out of the top sixty in 2013[39].

[39]Due to the financial crisis, a lot of banks have gone through reorganization. Wachovia (USA) was acquired by Wells Fargo in 2008. As a result of the trading loss in 2008, Caisse Nationale d. Caisses (France) merged with Banque fédérale des banques populaires in July 2009 to become Groupe BPCE. After encountering the financial problem in 2008, Fortis Bank NV/SA (Belgium) was sold its ownership to BNP Paribas in 2010. Calyon (France) was dissolved in 2008 and rebranded as Crédit Agricole Corporate and Investment Bank in 2010. Dresdner Bank Group (Germany) was acquired by Commerzbank in December 2009. Landesbank Baden-Wurtte (Germany) and Bayerische Landesbank (Germany) used to rank 34th and 41st in the sample of international banks in Pérignon and Smith (2010), but both have been crowded out of the world's top sixty in 2013.

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Holding Period	Confidence Level	High, Low, Average	Year-End Var	Risk Category	Diversification	Previous Year	Histogram Daily VaR	Plot Daily Var	Hypothetical Revenue	No Trading Fees	Histogram Daily Rev.	Plot Daily Revenue	Exceptions	Explanation Exceptions	VaRDI
Panel A: US banks																			
1	JPMorgan Chase&Co	USA	2,415.69	1	1	1	1	1	1	1	0	2	0	0	0	2	1	0	12
2	Bank of America	USA	2,102.27	1	1	1	1	1	1	1	0	2	0	0	1	1	2	0	13
3	Citigroup Inc	USA	1,880.38	0	1	1	1	1	1	1	0	2	0	0	1	1	2	0	12
4	Wells Fargo	USA	1,527.02	1	1	1	1	1	1	1	1	1	0	0	0	2	2	0	13
5	Goldman Sachs Group	USA	911.51	1	1	1	1	1	1	1	0	2	0	0	1	0	0	0	10
6	Morgan Stanley	USA	832.70	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	11
	U.S. Bank	USA	364.00	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	4
	State Street	USA	243.30	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
	Sun Trust	USA	175.00	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	4
	Key Bank	USA	91.00	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
	Wachovia	USA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Panel B: Canadian banks																			
1	Toronto-Dominion Bank	Canada	810.67	1	1	1	1	1	1	1	0	2	1	0	0	2	2	0	14
2	Royal Bank of Canada	Canada	808.66	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
3	Bank of Nova Scotia	Canada	698.721	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
4	Bank of Montreal	Canada	504.743	1	1	1	1	1	1	1	0	2	0	0	1	1	0	0	11
	CIBC	Canada	398.39	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
	National Bank of Canada	Canada	195.30	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
Panel C: Global banks																			
1	Industrial & Commercial Bank of China (ICBC)	China	3,125.97	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
2	HSBC Holdings	UK	2,617.32	1	1	1	1	1	0	1	0	2	0	0	1	0	2	0	11
3	China Construction Bank Corporation	China	2,538.62	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
4	BNP Paribas	France	2,486.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Mitsubishi UFJ Financial Group	Japan	2,462.90	1	1	1	1	0	0	0	0	2	0	0	0	0	0	0	6
6	JPMorgan Chase&Co	USA	2,415.69	1	1	1	1	1	1	1	0	2	0	0	0	2	1	0	12
7	Agricultural Bank of China	China	2,406.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Credit Agricole Group	France	2,356.45	1	1	1	1	1	1	1	0	2	0	0	0	0	1	0	10
9	Bank of China	China	2,292.59	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	6
10	Deutche Bank	Germany	2,225.35	1	1	1	1	1	1	1	0	2	1	0	1	1	1	1	14
11	Barclays PLC	UK	2,164.60	1	1	1	1	1	1	1	0	2	0	0	1	0	1	0	11
12	Bank of America	USA	2,102.27	1	1	1	1	1	1	1	0	2	0	0	1	1	2	0	13
13	Japan Post Bank	Japan	1,939.89	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	4
14	Citigroup Inc	USA	1,880.38	0	1	1	1	1	1	1	0	2	0	0	1	1	2	0	12
15	Mizuho Financial Group	Japan	1,794.54	1	1	1	1	1	0	1	0	2	0	0	0	0	1	0	9
16	Societe Generale	France	1,705.90	1	1	1	1	0	0	1	0	2	0	0	1	0	0	0	8
17	Royal Bank of Scotland Group	UK	1,695.50	1	1	1	1	1	1	1	0	2	0	0	0	2	1	1	13
18	Groupe BPCE	France	1,551.59	1	1	0	1	1	1	1	0	2	0	0	0	2	2	0	12
19	Banco Santander	Spain	1,540.70	1	1	1	1	1	1	1	1	1	1	0	0	2	1	1	14
20	Wells Fargo	USA	1,527.02	1	1	1	1	1	1	1	1	1	0	0	0	2	2	0	13
21	Sumitomo Mitsui Financial Group	Japan	1,497.16	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	7
22	Lloyds Banking Group	UK	1,397.19	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
23	China Development Bank	China	1,352.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	UniCredit S.p.A	Italy	1,168.11	1	1	1	1	0	0	1	0	2	1	0	0	2	2	0	12
25	UBS AG	Switzerland	1,138.26	1	1	1	1	1	1	1	0	2	0	1	1	1	0	0	12
26	ING Bank N.V.	Netherlands	1,087.63	1	1	1	1	1	1	1	0	2	1	1	0	2	2	0	15
27	Bank of Communications	China	984.99	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
28	Credit Suisse Group	Switzerland	983.78	1	1	1	1	1	1	1	0	2	0	0	1	0	1	0	11
29	Rabobank Group	Netherlands	983.99	1	1	1	1	1	1	0	0	2	0	0	0	0	0	0	8
30	Postal Savings Bank of China	China	922.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rank	Bank Name	Country	Total Assets (US$ billion, 2013)	Holding Period	Confidence Level	High, Low, Average	Year-End Var	Risk Category	Diversification	Previous Year	Histogram Daily VaR	Plot Daily Var	Hypothetical Revenue	No Trading Fees	Histogram Daily Rev.	Plot Daily Revenue	Exceptions	Explanation Exceptions	VaRDI
31	Goldman Sachs Group	USA	911.51	1	1	1	1	1	1	1	0	2	0	0	1	0	0	0	10
32	Credit Mutuel Group	France	891.05	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3
33	Nordea Bank	Sweden	870.63	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
34	Intesa Sanpaolo	Italy	864.90	1	1	1	1	1	0	1	0	2	0	1	0	2	1	1	13
35	Morgan Stanley	USA	832.70	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	11
36	Norinchukin Bank	Japan	823.983	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3
37	Toronto-Dominion Bank	Canada	810.67	1	1	1	1	1	1	1	0	2	1	0	0	2	2	0	14
38	Royal Bank of Canada	Canada	808.66	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
39	BBVA	Spain	804.539	1	1	1	1	1	1	1	0	2	0	0	0	2	2	0	13
40	CommerzbankAG	Germany	759.085	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	6
41	National Australia Bank	Australia	772.389	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
42	Bank of Nova Scotia	Canada	698.721	1	1	1	1	1	1	1	0	2	1	0	1	1	2	0	14
43	Commenwealth Bank of Australia	Australia	697.798	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	6
44	Standard Charted Plc	UK	674.38	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	7
45	China Merchants Bank	China	663.67	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
46	KfW Group	Germany	641.891	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
47	Australia & Newzealand Banking Group	Australia	627.063	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
48	Westpac Banking Corp	Australia	625.365	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
49	Shanghai Pudong Development Bank	China	608.104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Industrial Bank Co. Ltd	China	607.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	China CITIC Bank Corp	China	601.671	1	1	1	1	1	0	1	0	2	0	0	1	1	2	0	12
52	Danske Bank	Denmark	597.47	1	1	1	1	1	1	1	0	2	1	0	0	2	1	0	13
53	Sberbank Bank	Russia	557.176	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
54	Banco do Brazil SA	Brazil	552.67	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
55	DZ Bank AG	Germany	534.419	1	1	1	1	1	0	1	0	2	0	0	0	0	1	1	10
56	China Minsheng Banking Corp	China	533.099	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	ABN AMRO Group NV	Netherlands	513.765	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
58	Bank of Montreal	Canada	504.743	1	1	1	1	1	1	1	0	2	0	0	1	1	0	0	11
59	La Caixa Group	Spain	485.105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Cassa Depositi e Prestiti(CDP)	Italy	470.187	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Table 4.9 VaR Disclosure across the World in 2013

This table is in comparison with table 2 in Pérignon and Smith (2010). There are three panels in the table which illustrate the Value-at-Risk Disclosure Index (VaRDI) and its individual components in 2013. The VaRDI covers 6 facets of Value-at-Risk (VaR) disclosure including 15 individual components. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Var characteristics (1 point if holding period and 1 point if confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (1 point if high, low, average VaR, 1 point if year-end VaR, 1 point if risk category and 1 point if diversification). 3. Intertemporal comparison (1 point if previous year). 4. Daily VaR figures (1 point if there is a histogram of daily VaRs and 1 point if plotting daily VaRs in the meantime; or 1 point if there is a histogram of daily VaRs and 0 points if no plot of daily VaRs; or 0 points if no histogram of daily VaRs and 2 points if plotting daily VaRs). 5. Trading revenues (1 point if hypothetical trading revenue, 1 point if considering trading fees in hypothetical trading revenue, 1 point if there is a histogram of daily trading revenues and 1 point if plotting daily trading revenues in the meantime; or 1 point if there is a histogram of daily trading revenues and 0 points if no plot of daily trading revenues; or 0 points if no histogram of daily trading revenues and 2 points if plotting daily trading revenues). 6. Exceptions (1 point if stating the number of exceptions and 1 point if explaining the exceptions; or 2 points if no exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). In panel C, the top global sixty banks (by the asset size) at the end of 2013 are listed with their original countries, total asset

size (in US dollars at the end of 2013), 15 components of VaRDI and the overall score of VaRDI at the end. The information about the rank of these banks at the end of 2013 can be traced from the website http://www.relbanks.com/worlds-top-banks/assets-2013. Unlike panel C in table 2 of Pérignon and Smith (2010), panel C here has not trimmed off American and Canadian banks for a better view of the whole banking industry. Panel A focuses on the American banking industry which exhibits American banks, and there are 6 American banks in the global top sixty which are JPMorgan Chase and Co, Bank of America, Citigroup Inc., Wells Fargo, Goldman Sachs Group and Morgan Stanley. The other 5 banks (shown in light black) listed in panel A are in the goal to make a comparison with the previous research of Pérignon and Smith (2010). HSBC is regarded as a British bank, therefore it has not been listed in panel A. Wachovia has been acquired by Wells Fargo in 2008, hence Wachovia has no data available in 2013. There are 4 Canadian banks in the global top sixty which are Toronto-Dominion Bank, Royal Bank of Canada, Bank of Nova Scotia and Bank of Montreal. The other 2 banks (CIBC and National Bank of Canada) listed in panel B are not within the world's top sixty but are shown in the sample of Pérignon and Smith (2010).

Table 4.9 lists the VaRDI and its component elements for American, Canadian and world's top banks in 2013. The table provided here is in comparison with table 2 in Pérignon and Smith (2010). Unlike table 2 in Pérignon and Smith (2010), panel C of table 4.9 has not trimmed off the American and Canadian banks[40], in which panel C concludes all the world's top sixty banks.

The world's top sixty banks listed in table 4.9 have covered approximately 80% of the banks listed in table 2 of Pérignon and Smith (2010). One significant change for the world's top sixty banks in 2013 compared to 2005 is that a number of Chinese banks have entered into the top sixty. Among the world's top sixty banks in 2013, there are twelve banks from China, and China is the country which has the largest amount of banks in the top sixty. By contrast to 2005, there were only four banks from China in the world's top fifty. The US is the country which has the second largest amount of banks in the top sixty in 2013 such that there are six banks from the US in the top sixty. Followed by China and the US, each of these three countries (the UK, France, and Japan) has five banks in the top sixty in 2013. In 2013, the countries which also have banks listed in the top sixty are Australia (4 banks), Brazil (1 bank), Canada (4 banks), Denmark (1 bank), Germany (4 banks), Italy (3 banks), Netherlands (3 banks), Russia (1 bank), Sweden (1 bank), Switzerland (2 banks) and Spain (3 banks).

Because of the bankruptcy or the merger with other banks, several banks have been excluded from the top list. In the US sample of Pérignon and Smith (2010), Wachovia used to be the fourth-largest bank in the US, but Wachovia no longer exists due to the acquisition by Wells Fargo in 2008.

[40] Pérignon and Smith (2010) regard a bank outside the US and Canada as an international bank. In Pérignon and Smith (2010), panel C of table 2 is the section including only international banks without American and Canadian banks.

In Japan, the Bank of Tokyo-Mitsubishi used to rank 16th in the sample of international banks by Pérignon and Smith (2010), and the Bank of Tokyo-Mitsubishi has changed its name to Mitsubishi UFJ Financial Group after the merger with UFJ Group in 2006. In 2013, Mitsubishi UFJ Financial Group ranks 5th in the world's top sixty banks.

Europe is the area seeing the most banks being excluded from the top list. Many banks are being excluded from the top list after the impact of the 2008 financial crisis. Fortis Bank NV/SA in Belgium used to rank 19th in the sample of international banks by Pérignon and Smith (2010). After encountering severe problems during the 2008 financial crisis, Fortis Bank NV/SA was broken up and the banking business was sold to BNP Paribas. In 2013, BNP Paribas in France ranks 4th in the world's top sixty banks. In 2013, there is no bank from Belgium listed in the world's top sixty. There are two banks from France in the sample of Pérignon and Smith (2010) which have been dismissed after the 2008 financial crisis. Caisse Nationale d. Caisses used to rank 17th in the sample of international banks by Pérignon and Smith (2010). After suffering the trading loss of €751 million in 2008, Caisse Nationale d. Caisses merged with Banque fédérale des banques populaires (BFBP) in July 2009 to become Groupe BPCE. Another French bank called Calyon has been dissolved in 2008 and Calyon used to rank 28th in the sample of international banks by Pérignon and Smith (2010). Calyon rebranded as Crédit Agricole Corporate and Investment Bank in 2010, which is the investment banking division of Crédit Agricole Group nowadays. In 2013, the French bank Crédit Agricole Group ranks 8th in the world's top sixty banks. There are two banks from Germany in the international group of Pérignon and Smith (2010) but both had been dismissed after 2005, which are Bayerische Hypo-und Ver. and Dresdner Bank. Bayerische Hypo-und Ver. used to rank 27th in the sample of

international banks by Pérignon and Smith (2010) and it had been taken over by UniCredit Group in November 2005. Now the new name of these two combined entities is UniCredit Bank Aktiengesellschaft, and the bank is under the supervision of UniCredit Group in Italy. The annual report of Unicredit Bank Aktiengesellschaft provided after its delisting in the stock market after 2008 is a voluntary statement in compliance with the German Corporate Governance Code. In 2013, the UniCredit Group ranks 24th in the world's top sixty banks. Another Germany bank called Dresdner Bank used to rank 29th in the sample of international banks by Pérignon and Smith (2010), after its bankruptcy in 2008, Dresdner Bank had been acquired by its Germany competitor Commerzbank in 2009. In 2013, Commerzbank ranks 40th in the world's top banks. There are additional two banks that have been shown in the sample of international banks by Pérignon and Smith (2010) but have not been listed in the world's top sixty banks in 2013. Though the two banks still exist, their sizes are not big enough to squeeze into the world's top sixty banks in 2013. Both of the banks are from German, which are Landesbank Baden-Wurtte and Bayerische Landesbank.

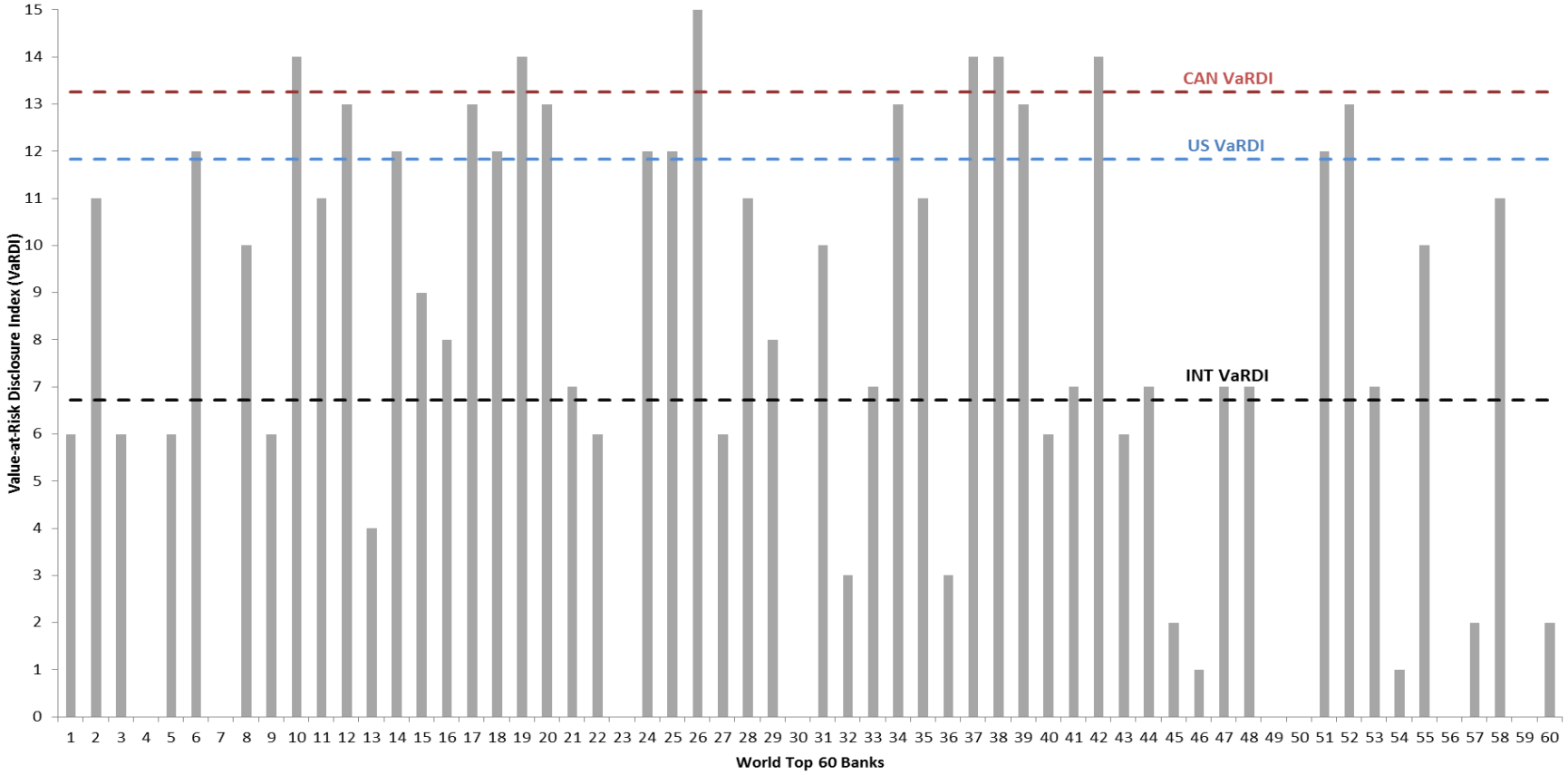

Figure 4.7 Columns for VaR Disclosure in 2013

The above columns demonstrate the VaR Disclosure Index (VaRDI) for the world's top sixty banks in 2013. The horizontal axis represents the top sixty world banks by their ranks. The vertical axis represents the score of VaRDI ranging from 0 to 15. The individual column corresponded within x and y axis indicates the VaRDI for each individual bank. Within the top sixty banks, there are 6 American banks and 4 Canadian banks. The horizontal dotted red line (CAN VaRDI) and the horizontal dotted blue line (US VaRDI) represent the average scores of VaRDI for American and Canadian banks respectively. The average score of VaRDI for the 6 American banks is 11.83 and the average score of VaRDI for the 4 Canadian banks is 13.25. For the non-American and non-Canadian banks, this comparison research regards them as international banks like Pérignon and Smith (2010). The horizontal dotted black line (INT VaRDI) represents the average score of VaRDI

for the 50 non-American and non-Canadian banks around the world. The average score of VaRDI for the 50 non-American and non-Canadian banks is 6.72. This figure is in comparison with figure 3 in Pérignon and Smith (2010).

In order to provide an intuitive sense of the VaRDI status for the world's top sixty banks, this research has produced the above bar chart which is in comparison with figure 3 in Pérignon and Smith (2010).

There are three findings through table 4.9 and figure 4.7 collectively: 1.There is a variation in the disclosure of VaR information among the world's top sixty banks. 2. The average score of VaRDI for the first half of the world's top sixty banks is 8.57 and the average score of VaRDI for the second half of the world's top sixty banks is 6.77, which suggests that larger banks disclose more comprehensive VaR information compared to smaller banks. Assuming an unequal variance, the difference between the first half of the world's top sixty banks and the second half of the world's top sixty banks is statistically significant at 10% confidence level. 3. The average score of VaRDI for the world's top sixty banks is 7.66. There are six American banks and four Canadian banks within the world's top sixty banks. The average score of VaRDI for the six American banks is 11.83 and the average score of VaRDI for the four Canadian banks is 13.25. The average score of VaRDI for the fifty non-American and non-Canadian banks is 6.72. The average score of VaRDI for the American and Canadian banks is higher than the non-American and non-Canadian banks. Assuming an unequal variance, the difference of the average score of VaRDI between the six American banks and the fifty non-American and non-Canadian banks is statistically significant at 10% confidence level, and the difference of the average score of VaRDI between the four Canadian banks and the fifty non-American and non-Canadian banks is statistically significant at 1% confidence level.

The first two findings that a variation status of VaR information disclosure among the world's top banks and a higher disclosure level of VaR information in the larger banks are consistent with the statements in Pérignon and Smith (2010).

The third finding that the average score of VaRDI in American banks is higher than in international (non-American and non-Canada) banks is different from Pérignon and Smith (2010). In Pérignon and Smith (2010), the average score of VaRDI in Canadian banks is higher than the average score of VaRDI in international banks, and the average score of VaRDI in international banks is higher than the average score of VaRDI in American banks. In 2013, although the average score of VaRDI in Canadian banks is still higher than the average score of VaRDI in American banks, the average score of VaRDI in international banks is no longer higher than the average score of VaRDI in American banks. The average score of VaRDI in American banks has increased from 7.0 in 2005 to 11.83 in 2013. Meanwhile, the average score of VaRDI in international banks has decreased from 7.8 in 2005 to 6.72 in 2013. The world's top sixty banks have been recomposed especially with the increased proportion of Chinese banks in the top sixty. The relatively low level of VaR disclosures amongst these Chinese banks is an underlying reason for the fall of the average score of VaRDI in the international banks. As shown in panel C of table 4.9, China Development Bank (China) ranked 23rd, Postal Savings Bank of China (China) ranked 30th, Shanghai Pudong Development Bank (China) ranked 49th, Industrial Bank Co. Ltd (China) ranked 50th, and China Minsheng Banking Corp (China) ranked 56th are all Chinese banks that newly squeezed into the top list compared to the sample in Pérignon and Smith (2010), but none of these Chinese banks has information disclosures about VaR.

VaR disclosure by country	World	Australia	Brazil	Canada	China	Denmark	France	Germany	Italy	Japan	Netherlands	Russia	Spain	Sweden	Switzerland	UK	USA
Number of Banks	60	4	1	4	12	1	5	4	3	5	3	1	3	1	2	5	6
Panel A																	
Average VaRDI	7.7	5.4	1.0	13.3	3.2	13.0	6.6	7.8	9.0	5.8	8.3	7.0	9.0	7.0	12.0	9.6	11.8
Standard Deviation VaRDI	4.8	0.5	N/A	1.5	4.0	N/A	5.0	5.6	6.1	2.4	6.5	N/A	7.8	N/A	0.7	3.0	1.2
Minimum VaRDI	0.0	6.0	1.0	11.0	0.0	13.0	0.0	1.0	2.0	3.0	2.0	7.0	0.0	7.0	11.0	6.0	10.0
Maximum VaRDI	15.0	7.0	1.0	14.0	12.0	13.0	12.0	14.0	13.0	9.0	15.0	7.0	14.0	7.0	12.0	13.0	13.0
Panel B																	
Holding Period	77%	100%	0%	100%	50%	100%	60%	75%	100%	80%	100%	100%	67%	100%	100%	100%	84%
Confidence Level	84%	100%	100%	100%	50%	100%	60%	100%	100%	80%	100%	100%	67%	100%	100%	100%	100%
High, Low, Average VaR	72%	100%	0%	100%	42%	100%	40%	75%	67%	60%	67%	100%	67%	100%	100%	100%	100%
Year-End VaR	73%	75%	0%	100%	33%	100%	80%	75%	67%	80%	67%	100%	67%	100%	100%	100%	100%
Risk Category	70%	100%	0%	100%	42%	100%	60%	75%	33%	40%	67%	100%	67%	100%	100%	100%	100%
Diversification	48%	100%	0%	100%	8%	100%	40%	25%	0%	0%	67%	100%	67%	100%	100%	40%	100%
Previous Year	72%	100%	0%	0%	42%	100%	80%	75%	67%	40%	33%	100%	67%	100%	100%	100%	100%
Histogram Daily VaR	15%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	0%	0%	33%
Plot Daily VaR	46%	0%	0%	75%	8%	100%	60%	50%	67%	20%	67%	0%	67%	0%	100%	60%	84%
Hypothetical Trading Revenue	13%	0%	0%	0%	0%	100%	0%	25%	33%	0%	33%	0%	33%	0%	0%	0%	0%
No Trading Fees	7%	0%	0%	0%	0%	0%	0%	0%	33%	0%	33%	0%	0%	0%	50%	0%	13%
Histogram Daily Trading Revenue	23%	0%	0%	75%	8%	0%	20%	25%	0%	0%	0%	0%	0%	0%	100%	40%	67%
Plot Daily Trading Revenue	32%	0%	0%	100%	8%	100%	20%	25%	67%	0%	33%	0%	67%	0%	50%	20%	67%
Exceptions	43%	0%	0%	75%	8%	100%	40%	50%	67%	40%	33%	0%	67%	0%	50%	80%	84%
Explanation of Exceptions	8%	0%	0%	0%	0%	0%	0%	50%	33%	0%	0%	0%	33%	0%	0%	20%	0%

Table 4.10 VaR Disclosure by Country in 2013

There are sixteen countries with banks listed in the world's top sixty in 2013, and the number of banks within the world's top sixty is shown under each country in the table above. Panel A in table 3 presents some summary statistics for the VaRDI across different countries. Since Brazil, Denmark, Russia, and Sweden have only one bank listed in the world's top sixty, the standard deviation of VaRDI is not available for these four countries. Panel B presents the percentage ratios of disclosures for the elements of VaRDI in the world and in each country. The VaRDI covers 6 facets of Value-at-Risk (VaR) disclosure including 15 individual elements. The VaRDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Var characteristics (1 point if holding period and 1 point if confidence level e.g. 99%, 95%). 2. Summarized VaR characteristics (1 point if high, low, average VaR, 1 point if year-end VaR, 1 point if risk category and 1 point if diversification). 3. Intertemporal comparison (1 point if previous year). 4. Daily VaR figures (1 point if there is a histogram of daily VaRs and 1 point if plotting daily VaRs in the meantime; or 1 point if there is a histogram of daily VaRs and 0 points if no plot of daily VaRs; or 0 points if no histogram of daily VaRs and 2 points if plotting daily VaRs). 5. Trading revenues (1 point if hypothetical trading revenue, 1 point if considering trading fees in hypothetical trading revenue, 1 point if there is a histogram of daily trading revenues and 1 point if plotting daily trading revenues in the meantime; or 1 point if there is a histogram of daily trading revenues and 0 points if no plot of daily trading revenues; or 0 points if no histogram of daily trading revenues and 2 points if plotting daily trading revenues). 6. Exceptions (1 point if stating the number of exceptions and 1 point if explaining the exceptions; or 2 points if no exceptions). The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum). The percentage ratio is calculated by the number of banks which have reported the corresponding element divided by the number of banks in the world or in each country. The table is in comparison with table 3 in Pérignon and Smith (2010).

The majority of the top sixty banks are from western countries which are mainly in Europe, North America and Australia. In South America, Brazil has one bank listed in the top sixty. In Asia, only China and Japan have banks listed in the top sixty.

Summary statistics for the VaRDI across countries are presented in table 4.10. This is to facilitate the comparison with table 3 in Pérignon and Smith (2010). Compared to the world's top sixty banks in 2005, the spread of the world's largest banks across countries is more diverged, which means that there are more countries with banks listed in the world's top sixty in 2013. In 2005, there are eleven countries with banks listed in the world's top sixty, while in 2013, there are sixteen countries with banks listed in the world's top sixty. Australia, Brazil, Denmark, Russia, and Sweden are the countries which have banks listed in the top sixty in 2013 but not in 2005.

For the average score of VaRDI on the country level, Brazil has the lowest value. China also has a relatively low value, in which the average score of VaRDI is 3.2. Nevertheless, when comparing to the results in Pérignon and Smith (2010) the average score among Chinese banks has improved, as no Chinese banks released any information related to VaR in 2005. Japan has not performed well either, with an average score of VaRDI 4.8 which is well below the world's average 7.7. The average score of VaRDI in Australia, France, Russia, and Sweden are below the world's average but above the value in Japan. The highest value among these countries is Canada with an average score of VaRDI 13.3. The second highest value among these countries is Denmark with an average score of VaRDI 13.0. Another two positive outliers in the average score of VaRDI are Switzerland and the USA.

American banks have demonstrated a high disclosure level related to VaR that the average score of VaRDI among the six top American banks in 2013 is 11.8. When

compared to the results in Pérignon and Smith (2010), American banks have improved their VaR disclosures in several aspects. First, the percentage ratios by which banks have disclosed in the elements of VaRDI such as plot of daily VaRs, plot of daily trading revenues, and exception counts have all increased. Second, while Perrignon and Smith (2010) report that the average score of VaRDI among top American banks does not differ from Germany, UK, France, Japan, etc., in contrast, the data in our updated sample suggests that American banks are ahead in disclosing information about VaR compared with most other countries. Similar to Perrignon and Smith (2010), our data suggests that Canada is still in the leading position in disclosing information about VaR.

Generally speaking, the banks from developed economies are more transparent which disclose relatively more information about VaR. As a developed economy, Japan stands out as being different from other developed economies for its lower disclosure level related to VaR. The banks from emerging economies such as China and Brazil clearly have disclosed less information about VaR.

4.8.5 The Operational Risk Information Disclosure in the World

In the meantime, this research has also made a table for the status of operational risk disclosures across countries. Table 4.11 presents the summary statistics of ORDI for different countries.

For the average score of ORDI on the country level, banks in Europe and North America have relatively high values. The highest average score of ORDI among these sixteen countries is Canada and the second highest one is Germany. Among the countries with higher scores of ORDI, Canada, France, Italy, Spain and the UK tend to disclose more in-depth information about operational risk such as data collection

process and operational reporting procedure. The countries with relatively low values are Russia, Brazil and China, which is similar to the finding in the previous section about VaRDI.

Operational Risk Disclosure by country	World	Australia	Brazil	Canada	China	Denmark	France	Germany	Italy	Japan	Ietherland	Russia	Spain	Sweden	Switzerland	UK	USA
Number of Banks	60	4	1	4	12	1	5	4	3	5	3	1	3	1	2	5	6
Panel A																	
Average ORDI	9.2	9.3	3.0	13.0	6.6	6.0	9.2	12.5	10.3	9.6	10.3	4.0	8.7	9.0	11.5	12.0	7.8
Standard Deviation ORDI	3.8	2.1	N/A	1.8	4.4	N/A	5.4	2.1	3.8	3.6	2.9	N/A	1.2	N/A	2.1	2.0	1.9
Minimum ORDI	0.0	7.0	3.0	11.0	0.0	6.0	0.0	10.0	6.0	4.0	7.0	4.0	8.0	9.0	10.0	9.0	6.0
Maximum ORDI	15.0	11.0	3.0	15.0	12.0	6.0	14.0	15.0	13.0	13.0	12.0	4.0	10.0	9.0	13.0	14.0	11.0
Panel B																	
Operational Risk	95%	100%	100%	100%	83%	100%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Reputation Risk	95%	100%	0%	100%	50%	0%	40%	75%	67%	80%	100%	0%	100%	0%	50%	80%	67%
Legal Risk	72%	50%	0%	75%	50%	0%	80%	100%	100%	80%	100%	0%	67%	0%	100%	80%	100%
Portion Risk Capital	58%	100%	0%	100%	33%	100%	60%	100%	67%	60%	67%	0%	0%	100%	100%	100%	0%
Caculation Method	73%	75%	100%	100%	42%	100%	80%	100%	67%	80%	100%	0%	67%	100%	100%	80%	67%
Previous Year	50%	100%	0%	75%	8%	100%	60%	100%	67%	60%	67%	0%	0%	100%	100%	100%	0%
Operational Governance Structure	92%	100%	100%	100%	75%	100%	60%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Reputation Governance Structure	38%	50%	0%	100%	25%	0%	0%	50%	0%	0%	67%	0%	67%	0%	50%	80%	50%
Legal Governance Structure	18%	0%	0%	50%	25%	0%	40%	25%	0%	0%	33%	0%	0%	0%	0%	20%	17%
Operational Measurement	92%	100%	0%	100%	83%	0%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Reputation Measurement	45%	0%	0%	100%	50%	0%	40%	75%	67%	40%	0%	0%	100%	0%	50%	80%	17%
Legal Measurement	35%	0%	0%	50%	25%	0%	80%	75%	67%	40%	0%	0%	0%	0%	0%	40%	50%
Data Collection Process	60%	0%	0%	75%	25%	0%	80%	100%	100%	80%	33%	0%	100%	100%	100%	80%	50%
Operational Reporting Procedures	67%	50%	0%	75%	42%	0%	80%	50%	100%	80%	100%	100%	67%	100%	100%	80%	67%

Table 4.11 Operational Risk Disclosure by Country in 2013

There are sixteen countries with banks listed in the world's top sixty banks in 2013, and the number of banks within the world's top sixty is shown under each country. Panel A in table 2 presents some summary statistics for the ORDI across different countries. Since Brazil, Denmark, Russia, and Sweden have only one bank listed in the world's top sixty, the standard deviation of ORDI is not available for these four countries. Panel B presents the percentage ratios of disclosures for the elements of ORDI in the world and in each country. The ORDI is an adopted index from Goyal and Wu (2007) which measures the operational risk disclosure. The ORDI covers 5 facets of operational risk disclosure including 14 individual components. The ORDI awards the corresponding score to the bank if the bank has disclosed the following information in its annual report: 1. Recognition and definition of operational risk (1 point if recognition and definition of operational risk as a risk exposure, 1 point if recognition and definition of reputational risk as a risk exposure and 1 point if recognition and definition of legal risk as a risk exposure). 2. Operational risk capital (1 point if operational risk capital is reported in percentage terms or 2 points if operational risk capital is reported in currency terms, and 1 point if the calculation method of operational risk capital is explained under Basel II). 3. Intertemporal comparison (1 point if operational risk capital is reported for previous years). 4. Governance (1 point if operational risk responsibility is adopted into the governance structure, 1 point if reputational risk responsibility is adopted into the governance structure and 1 point if legal risk responsibility is adopted into the governance structure). 5. Methodology/reporting (1 point if operational risk measurement or assessment methodology, 1 point if reputational risk measurement or assessment methodology, 1 point if legal risk measurement or assessment methodology, 1 point if operational loss data collection process and 1 point if operational risk internal reporting procedures.

4.8.6 VaR Estimation Methods

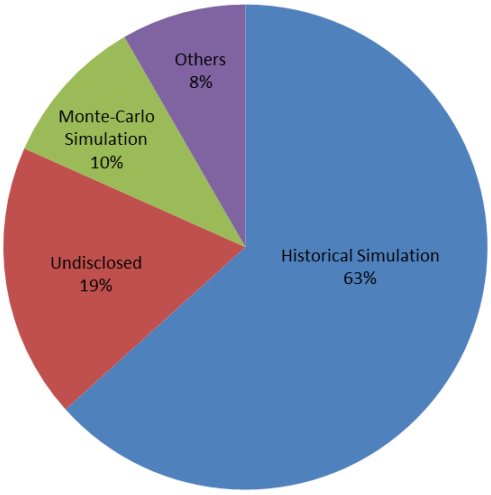

Figure 4.8 VaR Calculation Methods in 2013

This pie chart demonstrates the relative frequency of VaR calculation methods used by the world's top sixty banks in 2013. The figure is in comparison with figure 4 in Pérignon and Smith (2010).

The relative frequency for VaR calculation methods used by the world's top sixty banks in 2013 is displayed in the figure above. Compared to the result in Pérignon and Smith (2010), there are two significant changes:

First, there are fewer banks not disclosing their VaR estimation methods. The undisclosed ratio is 19% in the year 2013 which is nearly half of the previous ratio 35.1% in the year 2005. 81% of the banks in the sample have reported the methods of VaR estimation, and the remaining 19% of the banks in the sample which have not reported are mainly in the lower rank of the top sixty and with lower scores of VaRDI. The drop of the undisclosed ratio suggests that more banks have provided additional and in-depth information about VaR.

Second, in comparison to 2005, among the banks which have reported the VaR estimation method, more banks have adopted the historical simulation in 2013. The

relative frequency of the historical simulation has increased from 47.4% in the year 2005 to 63% in the year 2013. The percentage rate for the banks which use the Monte-Carlo simulation has decreased slightly from 14% in the year 2005 to 10% in the year 2013. In the meantime, there are 8% of the banks using other estimation methods. Other estimation methods are mainly the parametric model, like the hybrid model which combines the historical simulation with several control variables. Other estimation methods also include the combined use of the historical simulation and the Monte-Carlo simulation, for example, Standard Charted is regarded as in the other category, since it uses both the historical simulation and the Monte-Carlo simulation in the VaR estimation.

Theoretically, each of the two VaR calculation methods has its own advantage: the historical simulation has a most obvious advantage which is very easy to implement; the Monte-Carlo simulation can use any distribution hypothesis to produce unlimited hypothetical return which recuperates the limitation of historical data, and the Monte-Carlo simulation method is especially useful when we conduct the stress test.

Pérignon and Smith (2010) indicate that the underlying reasons for the popularity of historical simulation models are its smooth application and reduced complexity compared to parametric models. Andersen et al. (2007) believe that the volatility and correlation are time varying for financial assets. When taking numerous risk parameters into modelling, it is hard to figure out the correlation between these parameters with a time varying feature. The historical simulation leaves out the challenge of figuring out the correlation between these parameters. In addition, by using the historical simulation, banks could accommodate large dimensional portfolios without considering the risk derived from an inadequate correlation measurement among these parameters. Jorion (2002a) finds that market risk variables slowly

respond to market changes, and the significant market change only happens every sixty days. Therefore, the risk control mechanism should adopt a smooth approach like the historical simulation to ensure stability and pertinent. Although there is no guarantee for the estimation accuracy of smooth mechanism at all times, the historical evidence shows that the application of smooth mechanism like the historical simulation performs better than the fast moving mechanism like the Monte-Carlo simulation.

4.9 Summary

Although there is rise and fall, generally speaking, the scores of both the VaRDI and the ORDI have increased across the world's top banks during the period 1996-2013. This statistical finding suggests that the banking industry around the world is on the trend of enhanced risk disclosures. In addition, similar to the finding in Goyal and Wu (2008), developed economies are still in the leading position of risk information disclosures compared to emerging economies.

Chapter 5

Market Valuation and the Disclosure of Information about Exposure to Risk

Empirical Evidence from the Banking Industry

5.1 Introduction

Increased information disclosure may provide support to market valuation. Baumann and Nier (2003) provide evidence that increased information disclosure is associated with higher levels of market valuation for banks. However, this evidence is more than a decade old and whether the empirical result of Baumann and Nier (2003) is still applicable in a post-crisis world is a worthwhile question for investigation. Baumann and Nier (2003) focus on a broad aspect of financial information disclosures, while this research focuses on the requirements placed on banks by the Basel Accord II to disclose information about the market and operational risk[41] specifically. Focusing on risk disclosures in the banking industry as the research theme is motivated by the importance of the banking system in our economy.

[41] The Basel Accord I requires the bank to mainly disclose credit risk information. The Basel Accord II adds requirements for the disclosure of information about the market and operational risk exposures as two mandatory elements (detailed information can be traced through the Basel Committee website https://www.bis.org/bcbs/).

In this chapter, the disclosures of market and operational risk information are measured using two indices, the Value-at-Risk disclosure index (VaRDI) designed by Perignon and Smith (2010) and the operational risk disclosure index (ORDI) designed by Goyal and Wu (2007). The original information regarding the market and operational risk is extracted from public documents such as annual reports and SEC filings[42].

This chapter is outlined as follows. Sections two provides an introduction to the risk information disclosure by banking institutions and the potentially beneficial impact of such disclosures on market valuation. The third section briefly outlines the indices used to measure the level and quality of market and operational risk information disclosure by the banking industry. A more detailed description of these two indices is presented in chapter four. Section four introduces the regression analysis and the control variables employed in the estimation of the impact of risk information disclosure on market valuation. Sample selection, sample period and data sources are presented in the fifth section. Section six presents empirical results, while section seven presents additional robustness checks with the impacts of financial crisis and country development status. Section eight discusses these results and provides a comparison with previous research. The final section provides a brief summary and some concluding comments.

5.2 Background and Literature Review

5.2.1 Background

The banking industry is one of the most important sectors in our economy. The impact of the 2008 financial crisis derived from the banking industry was severe. While

[42] SEC stands for the US Securities and Exchange Commission. A SEC filing is a financial report or other formal documents submitted to the U.S. Securities and Exchange Commission (SEC). Public companies are required to submit regular SEC filings.

adventure is embedded in human nature and there is still a culture to encourage risk-taking for an extra return among the financial world, it is important that this risk-taking is carefully managed.

The Basel Committee in Switzerland has organized a forum for global central banks to formulate regulations in order to improve information transparency, in which the primary goal of doing so is to improve the health of the banking industry and prohibit systemic risk. In order to facilitate the goal of providing increased safeguards to the banking system, the Basel Committee proposed the Basel Accord II in 2004 which is an updated requirement of the Basel Accord I. The major difference between the Basel Accord I and the Basel Accord II is that the Basel Accord II adds the market and operational risk as mandatory disclosures, whist the Basel Accord I mainly includes credit risk as a mandatory disclosure. Since the appearance of the Basel Accord II, more central banks around the world have advocated their supervised banks to adopt and comply with the requirements in the Basel Accord II. Caprio (2013) finds that during the period of 2004-2008 most higher-income countries and even middle-income countries had adopted the Basel Accord II as their guideline for risk information disclosures. However, Caprio (2013) questions why this enhanced information disclosure in the banking industry within the period 2004-2008 had not prevented us from being hit by the 2008 financial crisis.

5.2.2 Broad Literature Supporting the Positive Relationship between Information Disclosure and Market Valuation

Increased information disclosure could affect trading volume, which would affect market valuation as well. Dye (1985) analyses the impact of information disclosure on market valuation, finding that shareholders prefer companies which choose to disclose relatively large amounts of information. Those companies which choose to disclose

relatively little information will suffer reduced demands for their equities and therefore experience lower equity prices. A company which captures the market's attention by favourable information will experience an increased demand for its stock, and consequently have a reduction in its cost of capital.

Research suggests that higher market valuations are associated with lower costs of capital, since a lower discount rate will raise the current value of an asset, all else being equal. Increased information disclosure helps to reduce cost of capital, since investors tend to require a lower return rate for the equities with information transparency. Both the quantity and the quality of information disclosure affect cost of capital (e.g. Akerlof, 1995; Easley and O'hara, 2004; Francis et al., 2005; Poshakwale and Courtis, 2005; Lambert et al., 2007; Dhaliwal et al., 2014). However, after exploring the cross-sectional association between firms' cost of capital and the information disclosures in firms' annual reports, Botosan (1997) finds that the evidence of the negative association between cost of capital and information disclosure only exists for firms with a lower analyst following.

Moreover, there exists evidence showing that information opacity could negatively affect trading volume and subsequently increase cost of capital. Bhattacharya et al. (2002) explore the link between earning opacity and trading volume in different countries. Three dimensions of the earning opacity are measured which are earning aggressiveness, loss avoidance, and earning smoothing. Controlling for the influence of other financial variables, Bhattacharya et al. (2002) find that an increase in the earning opacity is linked with a reduction in the stock trading volume and an increase in the cost of equity across a broad range of industries including the banking industry.

A direct empirical test conducted by Jiao (2011) examines the relationship between information disclosure and market valuation for a global sample consisting of 40 industries for the period of 1979-1996 and documents a positive relationship between information disclosure and market valuation. The information disclosure level is measured by the annual survey of Association for Investment Management and Research (AIMR)[43]. The market valuation is measured by Tobin's Q-Ratio. Cordella and Yeyati (1998) assert that enhanced information disclosure may reduce information asymmetry hence reduce the associated agency costs. The asymmetric information could also lead to adverse selection, in which bank managers or insiders have better knowledge than the financial market about the true value of a bank. Akerlof (1995), and Diamond and Verrecchia (1991) also suggest that increased information disclosures would reduce the costs associated with adverse selection by providing relatively equal information for all market participants.

Regional findings across the globe have confirmed the general statement which argues that information disclosure is helpful to increase the market valuation of a firm. Ousama et al. (2011) examine the impact of intellectual capital disclosure on market valuation by a sample of listed companies in Bursa Malaysia during the period of 2002–2006, and find that the intellectual capital disclosure has a significantly positive impact on the market valuation of these listed companies. A disclosure index is used in order to measure the extent of intellectual capital disclosure in the annual reports of these listed companies. By testing a sample consisting of 129 manufacturing companies listed on the Istanbul Stock Exchange (ISE) for the year 2010, Uyar and

[43] The Association for Investment Management and Research (AIMR) is the former institution of Chartered Financial Analysts (CFA) Institute. The CFA Institute is a global association of investment professionals which aims to lead the investment profession globally by promoting the highest standards of ethics, education, and professional excellence for the ultimate benefit of society. The CFA Institute is established in the US with more than 123,000 chartered financial analysts globally.

Kilic (2012) find that voluntary disclosure is value-relevant which affects firm value. This implies that market investors value voluntary disclosure. The more information firms disclose voluntarily, the higher value they have in the eyes of market investors. Therefore, the firm views this as an incentive to disclose more information to the market. Tsalavoutas and Dionysiou (2014) test a sample consisting of 150 listed companies in Greece for the year 2005 and find that the degree of compliance with the International Financial Reporting Standards (IFRS)[44] by a firm is value relevant, which suggests that the level and degree of compliance with IFRS is positively and significantly related to the market valuation of a firm. This finding is particularly meaningful for policymakers and regulatory institutions when considering the potential impacts of mandatory disclosure requirements. Saka and Oshika (2014) prove that the information disclosure of corporate carbon emission has a positive impact on the market valuation of a firm, in which the sample comprises 150 companies in Japan. This finding might be important and beneficial for companies including the carbon emission as a component of the nonfinancial disclosure. A similar study regarding the environmental information disclosure is conducted by Plumlee et al. (2015) which examines the relationship between the voluntary environmental disclosure by a firm and the value of a firm in the US. The value of a firm is measured in three ways: stock price, expected future cash flows, and implied cost of equity. The voluntary environmental disclosure of a firm is measured using a disclosure index which reflects the guidelines of the Global Reporting Initiative[45] framework. The

[44] The International Financial Reporting Standards (IFRS) is designed as a common global framework for business which assists companies in understanding and communicating with each other. The IFRS becomes more important as the increased trend of international business and trading. The IFRS gradually replaces many regional accounting standards. The main principles lying within the IFRS are comparable, understandable, reliable and relevant.

[45] The Global Reporting Initiative (GRI) is an international independent organization which aims to let the world realize the impacts of climate change, corruption, and human rights. It was established in the United States as a non-profit organization with the support of United Nations in 1997. The GRI released

result provides evidence that the voluntary environmental disclosure is in general positively associated with the firm's value. Moreover, both the type and the nature of environmental disclosures are informative in affecting the firm's value. Therefore, disclosing broader environmental issues with quality reporting nature is extremely crucial in increasing the market valuation of a firm.

5.2.3 Literature Supporting the Positive Relationship between Information Disclosure and Market Valuation in the Banking Industry

Using Tobin's Q-Ratio to measure the market valuation and controlling for the differences in size, dividend payment, cost-to-income ratio, loan ratio, leverage ratio, beta, loan growth, and return on equity, the regression analysis conducted by Baumann and Nier (2003) provides evidence that the information disclosure by banks is positively related to their market valuations. Three disclosure indices are used to measure the information disclosure, in which the first index is the Center for International Financial Analysis Research (CIFAR) index of transparency, the second index only considers whether the bank has been listed on the US stock market, and the third index is the self-designed index by Baumann and Nier (2003) comprising seventeen categories related to information disclosures. Each of the three aggregate indices has been placed into the regression model along with control variables. Each of the three coefficients with respect to these three aggregate indices is positively associated with the market valuation, but the coefficient of the index that considers whether the bank has been listed on the US stock market does not show any statistical significance. Baumann and Nier (2003) believe that the underlying reason for a higher market valuation by increasing the level of information disclosure is a reduction in

its draft version of the Sustainability Reporting Guidelines in 1999, and the first full version of the guidelines was released in 2000.

asymmetric information. The asymmetric information could result in agency costs, in which the action taken by bank managers would maximize their personal interests instead of maximizing banks' interests. Such agency cost derived with respect to risk is imperfectly observed by outside investors, which would subsequently affect bank's market valuation.

For banking information disclosure, operational risk information has not received as much attention as credit risk information and market risk information in the past. After the emergence of the Basel Accord II, the importance of operational risk information has gradually been noted by the financial world. Motivated by the global recognition of the importance of operational risk information disclosure, Helbok and Wagner (2006) examine the operational risk disclosure through the annual reports of 49 banks around the world within the period 1998-2001. Helbok and Wagner (2006) compare the banks which have disclosed the operational risk information and the banks which have not disclosed the operational risk information, and find that the extent and content of disclosure about operational risk are negatively correlated with a bank's capital ratio and profitability ratio. Therefore, Helbok and Wagner (2006) argue that financial institutions with a lower equity/asset ratio and/or profitability ratio pay greater attention to disclosing operational risks, whereas those with higher ratios choose not to do so. The rationale behind this is that, the distressed bank wants to ease the worrying mood in the market by showing its strong operational regulation. The increased information disclosure of the distressed bank helps the market to get the knowledge of its prepared position confronting operational risk, and rebuild confidence in it.

Risk information is one part of sensitive information for banks. The modified guidance of banking estimation sensitivity disclosure advocated by the SFAS[46] asks banks to release more sensitive information, which is in a hope to better assist market participants in interpreting financial information and forecasting future share prices. By analysing a sample consisting of 180 US commercial banks from 2003-2005, Bhat (2008) finds that risk information disclosure has a positive effect on stock's fair value. Baht (2008) quantifies the risk information disclosure of these banks and uses a regression model to analyse the statistical significance of the quantified variable. A positive correlation is found between the market valuation of a bank and the level of risk information disclosure.

A higher rating for a bank indicates a higher market valuation of a bank. Using bank-level ratings for 39 countries, Demirgüç-Kunt et al. (2008) find that banks receive higher ratings from Moody's Investors Service are better complied with the core principles of the Basel Accord. This result is robust even by controlling the factors of institutional quality, macroeconomic variables, sovereign ratings, and reverse causality. Specifically, the countries with stringent standards in the disclosure of financial information have more highly rated banks, as the stringent disclosure of high-quality information strengthens the monitoring by regulators and markets alike. Therefore, banks aiming to upgrade their ratings should consider to enhance information disclosure by complying with the core principles of the Basel Accord.

[46] The SFAS stands for the Statement of Financial Accounting Standards, which details policies and accounting rules in the financial report of a company.

5.3 Measuring Risk Information Disclosure

The most relevant paper in tackling the association between market valuation and information disclosure is Baumann and Nier (2003) which uses three aggregate disclosure indices to measure the information disclosure. The first aggregate index uses the transparency index from the Center for International Financial Analysis Research (CIFAR), the second index only considers whether the bank has been listed on the US stock market, and the third index is their self-designed index comprising seventeen categories of company information. The Center for International Financial Analysis Research (CIFAR) index of transparency is an aggregate index measuring the information transparency across countries that the index is based on the disclosure level of domestic companies and non-financial companies. The US listing index considers whether the company is listed on the US stock market. It is assumed that the US listing might be associated with a higher quality and quantity of information disclosure, since the Securities and Exchange Commission (SEC) requires companies to obey the strict regulations of US GAAP[47] as part of the Form 20-F[48] filing.

The self-designed aggregate index in Baumann and Nier (2003) has covered 17 categories related to bank's performance. The 17 categories are loans by maturity, loans by type, loans by counterparty, problem loans, problem loans by type, securities by holding purpose, deposits by maturity, deposit by type of customer, money market funding, long-term funding, reserves, capital, contingent liabilities, off-balance sheet items, non-interest income and loan loss provisions. For the 17 categories in the index,

[47] GAAP or US GAAP is the Generally Accepted Accounting Principles which is adopted by the U.S. Securities and Exchange Commission (SEC).

[48] The Form 20-F is an information report required by the Securities and Exchange Commission (SEC) that asks all foreign companies which have been listed on the stock exchanges of the United States to submit to the US government. The SEC implicitly requires the foreign company to submit the Form 20-F within six months after the end of the company's fiscal year. The reporting standards and the eligibility requirements of Form 20-F are stated in the Securities Exchange Act of 1934.

0 is assigned if there is no entry for the corresponding category, and 1 is assigned if there is an entry for the corresponding category except for the categories of securities by type and capital index. For the category of securities by type, 0 is assigned if there is no entry, 1 is assigned if there is an entry of coarse breakdown and 2 is assigned if there is an entry of detailed breakdown. For the category of capital index, 0 is assigned if there is no entry, 1 is assigned if there is one entry, 2 is assigned if there are two entries and 3 is assigned if there are three or more entries. The maximum point when adding all the points in these 17 categories is 21.

In this research, two aggregate indices (VaRDI and ORDI) are used to measure the information disclosures of market risk and operational risk respectively.

5.3.1 The Index to Measure the Market Risk Information Disclosure

The VaRDI is an index proposed by Perignon and Smith (2010) in order to measure the market risk information disclosure in the banking industry. A comprehensive discussion of VaRDI is provided in section 4.3 or in Perignon and Smith (2010). The VaRDI has 6 categories which monitor 6 facets of the VaR reporting quantity and quality. The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum):

1. VaR characteristics (maximum 2 points): 1 point – the holding period (e.g. 1 day, 1 week), 1 point – the confidence level (e.g. 95%, 99%).

2. VaR statistics (maximum 4 points): 1 point – the high, low or average VaR, 1 point – the year-end VaR, 1 point – the VaR risk category (e.g. currency, option, equity), 1 point – considering the diversification effect.

3. Intertemporal comparison (maximum 1 point): 1 point – compared with the previous year VaR.

4. Daily VaR graph (maximum 2 points): 1 point – the histogram about daily VaRs, or 2 points – the plot of daily VaRs[49].

5. Trading revenues (maximum 4 points): 1 point – the hypothetical revenue, 1 point – the revenues deducted from the trading costs, 1 point – the histogram of daily revenues or 2 points – the plot of daily revenues[50].

6. Back-testing (maximum 2 points): 1 point – the number of exceptions or 2 points – zero exception, 1 point – the explanation of exceptions.

5.3.2 The Index to Measure the Operational Risk Information Disclosure

The ORDI is an index proposed by Goyal and Wu (2007) in order to measure the operational risk information disclosure in the banking industry. A comprehensive discussion of ORDI is provided in section 4.4 or in Goyal and Wu (2007). The ORDI has 5 categories which monitor 6 facets of the reporting quantity and quality of operational risk. The theoretical score of ORDI ranges from 0 (minimum) to 15 (maximum):

1. Recognition and definition of operational risk (maximum 3 points): 1 point – recognition and definition of operational risk as a risk exposure, 1 point – recognition and definition of reputational risk as a risk exposure, 1 point – recognition and definition of legal risk as a risk exposure.

2. Operational risk capital (maximum 3 points): 1 point – operational risk capital reported in percentage terms or 2 points – operational risk capital reported in currency

[49] If a bank releases both the histogram and the plot of daily VaRs at the same time, the VaRDI will not allocate 1 point to 4a and 2 points to 4b, instead it only allocate to each category 4a and 4b 1 point respectively. The maximum points for the category of daily VaR graph will not exceed 2 points.
[50] If a bank releases both the histogram and the plot of daily revenues at the same time, the VaRDI will not allocate 1 point to 5c and 2 points to 5d, instead it only allocate to each category 5c and 5d 1 point respectively. The maximum points for the category of daily VaR graph will not exceed 4 points.

terms, 1 point – the calculation method of operational risk capital explained under Basel II.

3. Intertemporal comparison (maximum 1 point): 1 point – operational risk capital reported for previous years.

4. Governance (maximum 3 points): 1 point – operational risk responsibility adopted into the governance structure, 1 point – reputational risk responsibility adopted into the governance structure and 1 point – legal risk responsibility adopted into the governance structure.

5. Methodology/reporting (maximum 5 points): 1 point – operational risk measurement or assessment methodology, 1 point – reputational risk measurement or assessment methodology, 1 point – legal risk measurement or assessment methodology, 1 point – operational loss data collection process, 1 point – operational risk internal reporting procedure.

5.4 Research Design

This research aims to investigate the relationship between the disclosures of risk information by a bank and the market valuation of the bank. The disclosures of risk information for market and operation are quantified by the indices VaRDI and ORDI respectively. The market valuation can be measured by Tobin's Q-Ratio used in previous literature such as Baumann and Nier (2003) and Jiao (2011).

$$Tobin's\ Q_{i,t} = F\left(disclosure\ index_{i,t-1}, Z_{i,t-1}\right) \quad (5.1)$$

As shown in equation (5.1), the regression model used in testing the association between market valuation and the disclosure level of risk information has added several control variables which are in the Z-vector. Baumann and Nier (2003) suggest

that the variables which may impact the market valuation of a bank include GDP growth of a country, size, dividend, cost-to-income, loan, leverage, beta and return on asset. Ousama et al. (2011) suggest that the variables which may affect the market valuation of a firm include book value, net profit, size, and leverage. Uyar and Kilic (2012) suggest that the variables which may impact the market valuation of a firm include size, leverage, profit, growth and return on asset. Calomiris and Nissim (2014) suggest that the variables which may impact the market valuation of a bank include loan, leverage, non-interest income, non-interest expense, size, interest rate exposure, book capital ratio and dividend. Khlif and Hussainey (2016) find that corporate size, leverage ratio, and profitability and risk factor are positively associated with risk reporting. Although the variables in Khlif and Hussainey (2016) are not directly linked with market valuation, it is still worth taking into account these variables. Since these variables have affected risk information disclosure, they may indirectly affect market valuation.

Combining the ideas regarding the control variables of market valuation in the previous literature, this research has chosen eight control variables into the regression model: log size, dividend ratio, cost-to-income ratio, loan ratio, leverage ratio, beta, loan growth, and return on asset. The logarithm of total assets considers the factor of the bank size that may capture the potential economic scale. A higher dividend ratio indicates a higher future cash flows that may have a positive impact on market valuation. However, excessive dividend payments would dampen the bank's long-term development. Therefore, a higher dividend ratio may also have a negative impact on market valuation. A higher cost-to-income ratio suggests that the bank is operating inefficiently; hence, it might be associated with a lower market valuation. On the other hand, a higher return on asset ratio suggests a good operational status of a bank that

may be associated with a higher market valuation. This is because that the return on asset reflects structural factors, such as the competition level within a country, and these structural factors are likely to remain into the future. Additionally, the return on asset ratio is thought to be linked to the professional level of management such that a high return on asset ratio signals a high level of expertise by managers. The loan ratio and the loan growth could signal the potential risk of a bank but could also signal the potential growth of a bank. The leverage ratio is an indebted status reflecting the bank's solvency issue, though this ratio is not important if the Modigliani-Miller theorem[51] is being held. A bank's beta is a measurement of the riskiness of a bank. Equity investors have an appetite for upside unlimited potential gains, hence risk-seeking investors may favour the banks which are sensitive to market movements, while risk adverse investors would be the opposite.

5.5 Data

5.5.1 Research Sample

This research uses the world's top sixty banks as the sample to look at the impact of risk information disclosure on the market valuation. The rank of the world's top sixty banks[52] are based on their asset size at the end of 2013. While most of the world's top sixty banks are listed on various stock exchanges, there are still ten banks among this

[51] The Modigliani–Miller theorem is a theory about capital structure and a forming basis for capital structure in modern finance. The theory states that under a certain market price situation like the classical random walk, with the absence of taxes, agency costs, bankruptcy costs, and asymmetric information, and in an efficient market, the value of a firm is unaffected by its financial structure. Since the value of a firm depends on neither its dividend policy nor its decision to raise capital by issuing stock or selling debt, the Modigliani–Miller theorem is often called the capital structure irrelevance principle. For example, two firms which are identical except for their financial structures, one is financed by equity only, and the other one is leveraged which is financed partly by equity and partly by debt. The Modigliani–Miller theorem argues that the values of these two firms are exactly the same.

[52] Further information regarding the rank of the world's top sixty banks can be traced through the website http://www.relbanks.com/worlds-top-banks/assets-2013.

group not being listed. These unlisted banks[53] are relatively small banks. Some large banks are not listed on the market, the possible reason for the large bank not being listed is that the large bank is newly established through mergence and has not fully prepared to go into the market like Group BPCE[54]. Therefore, the sample employed excludes any unlisted banks and covers the remaining listed banks.

5.5.2 Research Sample Period

The time period of VaRDI and ORDI is from the year 1996 to the year 2013, since the earliest available online public report is around the year 1996[55] which defines the starting period of our sample. The corresponding period of Tobin's Q-Ratio is from the year 1997 to the year 2014.

5.5.3 Data Sources

The market risk information and the operational risk information are measured by the designed indices VaRDI and ORDI respectively. Both the VaRDI and the ORDI extract the data from banks' public documents. This research has mainly fetched up the original public documents from three sources:

- Bank official websites, which contain the original annual reports and the related crucial information.

[53] The ten banks out of the top sixty not being listed on the market are: Japan Post Bank (from Japan, ranked 13th), Groupe BPCE (from France, ranked 18th), Rabobank Group (from Netherlands, ranked 29th), Postal Savings Bank of China (from China, ranked 30th), Credit Mutuel Group (from France, ranked 32nd), Norinchukin Bank (from Japan, ranked 36th), KfW Group (from Germany, ranked 46th), DZ Bank AG (from Germany, ranked 55th), La Caixa Group (from Spain, ranked 59th), and Cassa Depositi e Prestiti (from Italy, ranked 60th).

[54] As a result of the 2008 financial crisis, Caisse Nationale des Caisses D'épargne (CNCD) and Banque Fédérale des Banques Populaires (BFBP) merged in 2009 to become the second largest bank in France known as Group BPCE.

[55] The year 1996 and the year 1997 have only limited data, which is why chapter 4 has not included these two years in the research to look at the information disclosure status among these world's top banks.

- http://www.sec.gov/, which is the U.S. Securities and Exchange Commission official website. The data stream of the website contains 10-K[56], 10-Q[57] and 20-F[58] forms for American companies.

- https://bankscope.bvdinfo.com/ which is the database specially designated for the banking industry containing comprehensive information about banks, such as the original annual reports of 11,000 global banks.

The market-to-book ratio (Tobin's Q-Ratio), dividend ratio, cost-to-income ratio, loan ratio, leverage ratio, beta, loan growth and return on asset related to these banks are all obtained from datastream[59].

5.6 Empirical Results

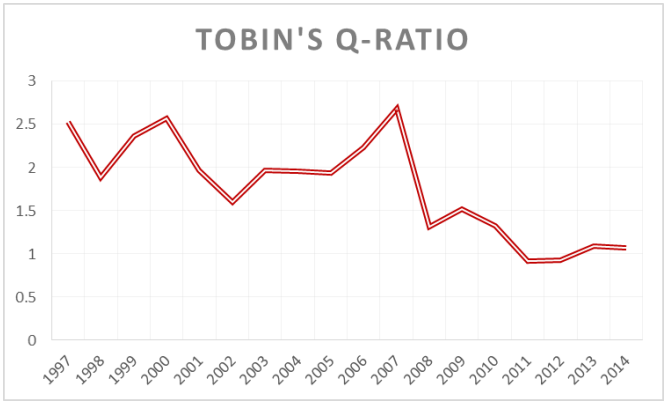

Figure 5.1 The Plot of the Average Annual Market Valuation

The figure above plots the average annual market valuations across all the sixty banks during the period 1997-2014. The market valuation is measured by Tobin's Q-Ratio. These sixty banks are the world's largest sixty banks ranked by asset size in 2013. The data panel is unbalanced.

[56] The 10-K form is an annual comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the company listed in the US stock market.
[57] The 10-Q form is a quarterly comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the company listed in the US stock market.
[58] The 20-F form is a comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the foreign company listed in the US stock market.
[59] Datastream is a database for the financial and economic research provided by the company of Thomson Reuters.

From the figure plotted above, it is easy to observe that there is a sharp decline in the average market valuation across these banks in 2008. The financial crisis is the suspected cause of this sharp decline of market valuation. After this sharp decline in 2008, the average market valuation has been hardly lifted.

	Obs	Mean	Std. Dev.	Minimum	25th Percentile	Median	75th Percentaile	Maximum
Dependent Variable								
Tobin's Q-Ratio	760	1.73	1.02	0.12	1.00	1.64	2.20	9.60
Disclosure Variables								
VaRDI	758	6.43	4.76	0.00	0.00	7.00	11.00	15.00
ORDI	758	5.86	4.13	0.00	2.00	6.00	9.00	15.00
Control Variables								
Log Size	810	8.97	0.79	5.24	8.57	8.90	9.26	11.41
Dividend Ratio	783	3.33	2.87	0.00	1.65	3.13	4.44	34.67
Cost-to-Income Ratio	782	6.52	72.95	-1478.03	2.99	4.52	7.91	943.34
Loan Ratio	690	55.06	15.25	11.02	44.92	57.91	66.10	85.53
Leverage Ratio	809	555.00	926.47	-21861.98	266.63	430.99	759.54	4588.28
Beta	768	1.28	0.52	-0.85	0.67	1.08	1.53	3.82
Loan Growth	706	15.29	65.14	-59.39	1.28	8.28	16.95	1592.20
Return on Asset	696	1.20	1.40	-15.13	0.67	1.08	1.53	15.99

Table 5.1 The Statistical Summary of Variables Used in the Market Valuation Analysis

The table above demonstrates the basic statistical description of variables used in this research for the fifty banks around the world. The fifty banks are selected from the world's top sixty banks (by asset size in 2013), in which the selection criteria take account of whether the bank has been listed on the market and whether the bank has appropriate data assisting the analysis. The sample period for Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The properties of data which are mean, standard deviation, 25th percentile, median, and 75th percentile are displayed accordingly to each data type.

5.6.1 Control Variables in the Market Valuation Analysis

	Log Size	Dividend Ratio	Cost-to-Income Ratio	Loan Ratio	Leverage Ratio	Beta	Loan Growth	Return on Asset
Log Size	1.00							
Dividend Ratio	-0.04	1.00						
Cost-to-Income Ratio	0.03	0.04	1.00					
Loan Ratio	-0.21	0.12	0.00	1.00				
Leverage Ratio	-0.03	0.03	0.03	-0.12	1.00			
Beta	0.14	-0.16	-0.03	-0.30	0.03	1.00		
Loan Growth	-0.03	-0.05	0.00	-0.01	0.00	-0.01	1.00	
Return on Asset	-0.07	-0.08	-0.04	0.35	0.00	-0.11	0.08	1.00

Table 5.2 The Correlation among the Control Variables Used in the Market Valuation Analysis

The table above shows the correlations among the control variables used in the market valuation analysis. The sample period for the control variables is from 1996 to 2013, in which the control variables are related to the fifty listed banks out of the world's top sixty banks.

Table 5.1 shows the summary statistics for the control variables used in the market valuation analysis. In order to avoid the multicollinearity problem, the correlations between these variables are tested and shown in table 5.2. The correlations between these variables are weak, which suggests that there is no evidence of a potential multicollinearity problem across these control variables.

Dependant Variable: Tobin's Q-Ratio	Coefficients	
Log Size	-0.0973**	-0.1075***
	(-2.05)	(-5.15)
Dividend Ratio	-0.0313***	-0.0336***
	(-3.03)	(-3.27)
Cost-to-Income Ratio	0.0001	
	(0.07)	
Loan Ratio	0.0088	
	(1.41)	
Leverage Ratio	0.0001***	0.0001**
	(3.02)	(2.16)
Beta	-0.1910***	-0.1946***
	(-3.49)	(-2.98)
Loan Growth	0.0002	
	(0.59)	
Return on Asset	0.0345*	0.0398*
	(1.73)	(1.80)
Constant	2.4428***	2.4767***
	(5.12)	(5.15)
Year Fixed Effects	Included	Included
Observations	*593*	*593*
Adjusted R-Squared	*0.423*	*0.446*

Table 5.3 The Coefficients of Control Variables in the Market Valuation Regression Analysis

The table above shows the coefficients of control variables in the market valuation regression analysis. The dependent variable is Tobin's Q-Ratio which measures the market valuation. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The data panel is unbalanced. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively. The first column contains all the control variables in the regression analysis, and the second column only includes the significant control variables from the first column in the regression analysis.

In table 5.3, the first column shows a basic model that includes all the control variables, in which the dependent variable is Tobin's Q-Ratio in the measurement of market valuation. The coefficient estimates are obtained using the ordinary least squares (OLS) estimation. This regression has taken into account the time differences, in which the

Hausman test rejects the null hypothesis of the year random effects leading to the year fixed effects.

The log size has a negative relationship with the market valuation, which suggests that large banks have a higher market valuation than small banks. The dividend ratio has a negative relationship with the market valuation. The underlying reason might be that market investors prefer a bank which retains dividend for its long-term development. The leverage ratio has a positive relationship with the market valuation, which suggests that a higher indebted bank is favourably valued by the market. The beta is in a negative relationship with the market valuation, which suggests that market investors prefer less risky banks. The return on asset ratio is positively related to the market valuation, which complies with intuition that a bank with strong financial performance attracts more attention from investors. The cost-to-income ratio is not a significant variable in explaining the variation of market valuation. The two variables (loan ratio and loan growth) related to the loan status in a bank show no statistically significant power in explaining the variation of market valuation.

In order to improve the estimation efficiency, this research has deleted insignificant control variables in the general model. This step of trimming the insignificant control variables, and later using the parsimonious model in the regression analysis to test the disclosure impact, is similar to that followed in previous studies such as Berman et al. (1999) and Baumann and Nier (2003). The significant control variables are retained and the coefficients regarding the parsimonious model are shown in the second column of table 5.3. The signs of these variables in the parsimonious model continue to be the same as in the general model.

5.6.2 The Effect of Risk Information Disclosure on the Market Valuation

Dependent Variable: Tobin's Q-Ratio	Coefficients	Dependent Variable: Tobin's Q-Ratio	Coefficients
VaRDI	**-0.0126****	**ORDI**	**-0.0226*****
	(-2.01)		**(-2.66)**
Log Size	-0.0062*	Log Size	-0.0112*
	(-1.81)		(-1.87)
Dividend Ratio	-0.0301***	Dividend Ratio	-0.0293***
	(-2.76)		(-2.72)
Leverage Ratio	0.0001**	Leverage Ratio	0.0001**
	(2.47)		(2.14)
Beta	-0.2447***	Beta	-0.2579***
	(-3.88)		(-4.18)
Return on Asset	0.0175*	Return on Asset	0.0133*
	(1.73)		(1.69)
Constant	2.1717***	Constant	2.1902***
	(6.34)		(6.43)
Year Fixed Effects	Included	Year Fixed Effects	Included
Observations	*593*	***Observations***	*593*
Adjusted R-squared	*0.4502*	***Adjusted R-squared***	*0.4655*

Table 5.4 The Coefficients of the Variables in the Market Valuation Regression Analysis

The table above shows the coefficients of the variables in the market valuation regression analysis. The dependent variable is Tobin's Q-Ratio which measures the market valuation. Both of the regressions include the control variables, in which the parsimonious model is used to introduce the control variables. The data panel is unbalanced. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

In order to assess the effect of risk information disclosure on the market valuation, the risk information disclosure indices (VaRDI and ORDI) are included in the parsimonious model respectively. Since the correlation between VaRDI and ORDI is relatively high at 0.66, the VaRDI and ORDI are placed into the model one at a time to avoid the multicollinearity problem. The parsimonious model concludes five control variables: log size, dividend ratio, leverage ratio, beta and return on asset. The empirical results are shown in table 5.4, which indicate that both the VaRDI and ORDI

have significantly negative relationships with the market valuation. Both the market risk information disclosure and the operational risk information disclosure are associated with reductions in the market valuation for the banking industry. One score increase in the VaRDI is associated with a reduction of around three hundredths in the market valuation, while one score increase in the ORDI is associated with a reduction of around seven hundredths in the market valuation. Alongside the VaRDI and ORDI, all the control variables show a statistical significance in explaining the variation of market valuation and maintained their signs as the same in the previous parsimonious model.

5.7 The Robustness Test

5.7.1 The Impact of Global Financial Crisis

The previous test based on the whole sample period presents evidence that the risk information disclosure indices (VaRDI and ORDI) are significantly and negatively related to the market valuation. This finding is in contrast to the results provided in previous literature such as Bhattacharya et al. (2002), Baumann and Nier (2003), Helbok and Wagner (2006), and Jiao (2011) which analyse the relationship between market valuation and information disclosure, asking whether firms that disclose relatively large amounts of information would have higher market valuation than firms that disclose relatively little. One possible reason for the divergence between the current research and the previous ones is the impact of the 2008 financial crisis. The existing empirical test is based on a sample gathered over the period 1997 to 2014. The financial crisis emerged in the middle of 2007. Shown in figure 5.1, the average market valuation is seriously hammered in 2008 and this impact even persists till 2014. In order to test for the effect of the exogenous shock of the financial crisis, we introduce

the period dummy variable Dp, which takes the value 0 up to and including 2007 and takes the value 1 after 2007.

This research adds the period dummy variable and its interaction variable with the disclosure index into the previous estimation model (equation 5.1). The new equation is shown below, where $Tobin's\ Q_{it}$ stands for the market valuation, $u_{i,t}$ is the constant term, $X_{i,t-1}$ stands for the disclosure index (VaRDI or ORDI), $Z_{i,t-1}$ is the vector of control variables, the additive dummy variable is Dp_t, the interaction dummy variable is $D_{pt} * X_{i,t-1}$, ε_{it} is the error term, and a_i and b_i are the corresponding coefficients. The control variables in vector Z_i are log size, dividend ratio, leverage ratio, beta and return on asset. The correlation analysis has been conducted previously to ensure that there exists no multicollinearity problem.

$$Tobin's\ Q_{i,t} = u_{i,t} + \beta_i\, Z_{i,t-1} + \gamma_i\, X_{i,t-1} + a_i Dp_t + b_i Dp_t X_{i,t-1} + year\ fixed\ effects + \varepsilon_{it} \qquad (5.2)$$

If the financial crisis and its post-period have a significant impact on the market valuation, it will potentially change the intercept by an amount of a_i or potentially change the coefficient of disclosure index by an amount of b_i or both. If the coefficient of disclosure index changed, the relationship between the risk information disclosure and the market valuation would be affected[60].

So in order to test whether the financial crisis has impacted the relationship, a joint hypothesis test is performed. The null hypothesis is written as H_0: $a_i = b_i = 0$ while the alternative hypothesis is H_1: H_0 is false. If the F-test[61] fails to reject the null

[60] The main effect variable and the interaction variable could be analyzed separately if the statistically significant levels between them are different.

[61] In the Analysis of Variance (ANOVA), the F-test can be used to assess whether the combined impact of a subset of independent variables has a significant impact on the dependent variable. The equation of

hypothesis, it means that the financial crisis and its post-period has no statistically significant role to play in this model. If the F-test rejects the null hypothesis, it means that the variables of the financial crisis and its post-period are statistically significant in this model. In this scenario, this research will go further to see whether and how the association between the risk information disclosure and the market valuation has been affected by the financial crisis. This technique is in principle an altered Chow test to determine whether this is a stable regression model for the whole period.

When X_i measures the impact of the information disclosure about exposure to the market risk via the VaRDI, the test statistic is $F_{m,n-k-1} = F_{2,593-8-1} = 42.3865$ with the corresponding P-value 0.0000. This result strongly rejects the null hypothesis H_0: $a_i = b_i = 0$ and suggests that the financial crisis has caused a structural change in the original model (equation 5.1). The coefficients and their corresponding t-ratios of the VaRDI, the additive dummy variable and the interaction dummy variable under the new model are shown below:

F-test can be written as $F_{m,n-k-1} = \frac{(RRSS-URSS)/m}{URSS/(n-k-1)}$, where RRSS stands for the Residual Sum of Squares for the Restricted model, URSS stands for the Residual Sum of Squares for the Unrestricted model, m is the number of restricted variables, n is the number of total observations, and k is the number of all independent variables.

Dependent Variable: Tobin's Q-Ratio	Coefficients	Observations	Adjusted R-squared
VaRDI	-0.0217***	*593*	*0.4627*
	(-2.83)		
Period Dummy	-0.8261***		
	(-4.35)		
Period Dummy * VaRDI	-0.0356***		
	(-3.41)		
Log Size	-0.0806		
	(-0.58)		
Dividend Ratio	-0.0355***		
	(-3.89)		
Leverage Ratio	-0.0001		
	(-1.16)		
Beta	-0.2868***		
	(-4.67)		
Return on Asset	0.0321*		
	(1.70)		
Constant	2.2052***		
	(6.09)		
Year Fixed Effects	Included		

Table 5.5 The Coefficients of the Market Risk Information Disclosure (VaRDI) and the Period Dummy Related Variables

The table above shows the coefficients of the variables of market risk information disclosure (measured by the VaRDI) and the coefficients of dummy related variables in the market valuation regression analysis. The period dummy variable defines the year before 2007 (including 2007) as 0 and the year after 2007 as 1. The dependent variable is the annual market valuation which is measured by Tobin's Q-Ratio. Besides the variables of VaRDI, period dummy, and period dummy*VaRDI, the other control variables are log size, dividend ratio, leverage ratio, beta and return on asset that these control variables have been proven to be statistically significant variables in explaining the variation of market valuation. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The data panel is unbalanced. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

Table 5.5 can be compared to the VaRDI part of table 5.4. In table 5.4, the coefficient of VaRDI is -0.0217 and statistically significant at 1% level, which suggests that over the whole sample period 1997–2014, the market risk information disclosure is significantly and negatively associated with the market valuation of a bank. In table 5.5, after the inclusion of additive and interaction dummy variables, the empirical result suggests that the VaRDI is statistically significant determinant of the market

valuation. That is to say, when the period dummy variable is equal to zero, the market risk information disclosure has a statistically significant and negative impact on the market valuation. When the period dummy variable is equal to one, it brings down the intercept by an amount of eight tenths and this impact is statistically significant at 1% level. The coefficient of the interaction dummy variable (period dummy*VaRDI) is -0.0356 and statistically significant at 1% level. That is to say, after the financial crisis, the association between the market valuation and the market risk information disclosure turns to be negative with statistical significance. A one unit increase in the score of VaRDI is associated with a reduction of around four hundredths in the market valuation.

When X_i measures the impact of the information disclosure about exposure to the operational risk via the ORDI, the test statistic is $F_{m,n-k-1} = F_{2,593-8-1} = 40.7658$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis H_0: $a_i = b_i = 0$ and suggests that the financial crisis has caused a structural change of the original model (equation 5.1). The coefficients and their corresponding t-ratios of the ORDI, the additive dummy variable and the interaction dummy variable under the new model are shown below:

Dependent Variable: Tobin's Q-Ratio	Coefficients	Observations	Adjusted R-squared
ORDI	-0.0396**	*593*	*0.4768*
	(-2.25)		
Period Dummy	-0.6758***		
	(-5.33)		
Period Dummy * ORDI	0.0279*		
	(1.72)		
Log Size	-0.0049		
	(-0.13)		
Dividend Ratio	-0.0355***		
	(-3.43)		
Leverage Ratio	0.0000		
	(0.71)		
Beta	-0.3208***		
	(-5.30)		
Return on Asset	0.0272		
	(1.43)		
Constant	2.1208***		
	(5.96)		
Year Fixed Effects	Included		

Table 5.6 The Coefficients of the Operational Risk Information Disclosure (ORDI) and the Period Dummy Related Variables for the Association Analysis between Market Valuation and Operational Risk Information Disclosure

The table above shows the coefficients for the variables of market risk information disclosure (measured by the ORDI) and the coefficients of the dummy related variables in the market valuation regression analysis. The period dummy variable defines the year before 2007 (including 2007) as 0 and the year after 2007 as 1. The dependent variable is the annual market valuation which is measured by Tobin's Q-Ratio. Besides the variables of ORDI, period dummy, and period dummy*ORDI, the other control variables are log size, dividend ratio, leverage ratio, beta and return on assets that these control variables have been proven to be statistically significant variables in explaining the variation of market valuation. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The data panel is unbalanced. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

Table 5.6 can be compared to the ORDI part of table 5.4. In table 5.4, the coefficient of ORDI is -0.0396 and statistically significant at 5% level, which suggests that over the whole sample period 1997–2014, the operational risk information disclosure is significantly and negatively associated with the market valuation of a bank. In table 5.6, the coefficient of ORDI still remains negative with statistical significance even after adding the additive dummy variable and the interaction dummy variable. That is

to say, when the period dummy variable is equal to zero which is the period before the financial crisis, the operational risk information disclosure has a significantly negative impact on the market valuation, in which one unit increase in the score of ORDI is associated with a reduction of around seven hundredths in the market valuation. The period dummy variable is the added intercept which is -0.6758 and statistically significant at 1% level. That is to say, after the financial crisis, the market valuation has been on average reduced seventy-eight hundredths. The coefficient of interaction dummy variable (period dummy*VaRDI) is 0.0279 and statistically significant at 10% level. When the period dummy variable is equal to one which is the period after the financial crisis, the coefficient of ORDI would be equal to (-0.0396+0.0279) which is -0.0118. That is to say, after the financial crisis, one unit increase in the score of ORDI is associated with a reduction of around one hundredth in the market valuation. The associations between the ORDI and the market valuation in two separate periods (before the financial crisis and after the financial crisis) are both negative with statistical significance.

In this section, this research has taken the financial crisis into consideration and added related variables into the previous association testing model (equation 5.1). Two added variables are the period dummy variable and its interaction variable with the disclosure index. The F-test shows that the combined effects of the two added variables are statistically significant in either case, when the disclosure index uses the VaRDI or the ORDI. Therefore, this research tabulates the coefficient results in table 5.5 and table 5.6 for both cases respectively. The financial crisis has a significant effect to reduce the average market valuation of a bank under either the disclosure index uses the VaRDI or the disclosure index uses the ORDI. When the disclosure index measures the market risk information via the VaRDI, a significantly negative association

between the market valuation and the market risk information is presented after the financial crisis which is the period from 2008 to 2014. When the disclosure index measures the operational risk information via the ORDI, significantly negative associations between the market valuation and the operational risk information are presented for both periods (before the financial crisis: 1997-2007 and after the financial crisis: 2008-2014). Generally speaking, the risk information disclosure is in a significantly negative association with the market valuation even after adding the additional period dummy related variables.

5.7.2 The Impact of Country Development Status

In the previous section, this research has proved that the period dummy related variables have a combined significance when adding to equation 5.1. Afterwards, this research takes a further step to see what impact the financial crisis brings to the association analysis between risk information disclosure and market valuation. Overall speaking, both the market risk information disclosure (measured by the VaRDI) and the operational risk information disclosure (measured by the ORDI) still present significantly negative associations with the market valuation after adding the additional period dummy related variables.

In this section, this research intends to investigate the association between risk information disclosure and market valuation that differs with the country development status. The banks in the current research sample are from sixteen countries worldwide, in which most of the countries are developed: Australia, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, the UK and the USA. There are fourteen banks from emerging countries: China, Russia, and Brazil. Emerging countries are assumed to be different from developed countries in terms of information transparency, legal system comprehensiveness, financial market

regulation, and maturity. The country dummy variable Dc divides the sample into two parts, which is the developed country denoted as the value 0 and the emerging country denoted as the value 1.

Equation 5.2 has been proven to be an efficient model in the association analysis, thus the emerging country related dummy variables would be added to equation 5.2. There are three new emerging country related dummy variables adding into the equation, which are the emerging country dummy variable, the interaction variable between emerging country dummy variable and disclosure index (VaRDI or ORDI), and the interaction variable between emerging country dummy variable and period dummy variable. The new equation is shown below, where $Tobin's\ Q_{it}$ stands for the market valuation, $u_{i,t}$ is the constant term, $X_{i,t-1}$ stands for the disclosure index (VaRDI or ORDI), $Z_{i,t-1}$ is the vector of control variables, the additive dummy variables are $Dp_t\ and\ Dc_t$, the interaction dummy variables are $Dp_t * X_{i,t-1}$, $Dc_i * X_{i,t-1}$ and $Dc_t * Dp_t$, ε_{it} is the error term, and $a_i, b_i, c_i\ \ d_i, e_i$ are the corresponding coefficients. The control variables under the vector Z_i stand for all the significant variables in explaining the variation of market valuation in table 5.3, in which the control variables included here are log size, dividend ratio, leverage ratio, beta and return on asset. The correlation analysis has been conducted previously to ensure that there exists no multicollinearity problem.

$$Tobin's\ Q_{it} = u_{i,t} + \beta_i\ Z_{i,t-1} + \gamma_i\ X_{i,t-1}\ + a_i Dp_t + b_i Dp_t X_{i,t-1} + c_i Dc_t +$$
$$d_i Dc_t X_{i,t-1} + e_i Dp_t Dc_t + year\ fixed\ effects + \varepsilon_{it} \qquad (5.3)$$

If the three new added variables which are Dc_t, $Dc_t * X_{i,t-1}$ and $Dc_t * Dp_t$ are not statistically redundant in equation 5.3, it will have the power to alter the intercept and the coefficient of information disclosure index. There are four different cases if

equation 5.3 holds: emerging country before the financial crisis, emerging country after the financial crisis, developed country before the financial crisis and developed country after the financial crisis.

Firstly, in order to test whether the three newly added variables are statistically redundant, a joint hypothesis test is performed. The model associated with the null hypothesis restricts the coefficients ($c_i, d_i \; and \; e_i$) of additive dummy variables and interaction dummy variables to zero. If the F-test[62] fails to reject the null hypothesis, it means that the three newly added variables are statistically redundant. In this scenario, this research will finish the test and conclude the finding that there is no difference for the association between emerging countries and developed countries. If the F-test rejects the null hypothesis, it means that the country dummy related variables have played a role in this model. In this scenario, this research will take a further look to see the difference between developed countries and emerging countries for the association analysis.

When X_i measures the information disclosure about exposure to the market risk via the VaRDI, the test statistic is $F_{m,n-k-1} = F_{3,593-11-1} = 19.2543$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $c_i = d_i = e_i = 0$ and suggests that there is a difference between emerging countries and developed countries for the association between the market risk information disclosure and the market valuation. Therefore, this research takes a further look at what kind of difference lying between emerging countries and developed countries for this

[62] In the Analysis of Variance (ANOVA), the F-test can be used to assess whether the combined impact of a subset of independent variables has a significant impact on the dependent variable. The equation of F-test can be written as $F_{m,n-k-1} = \frac{(RRSS-URSS)/m}{URSS/(n-k-1)}$, where RRSS stands for the Residual Sum of Squares for the Restricted model, URSS stands for the Residual Sum of Squares for the Unrestricted model, m is the number of restricted variables, n is the number of total observations, and k is the number of all independent variables.

association. The new coefficients and their corresponding t-ratios of the VaRDI, the additive dummy variables, and the interaction dummy variables are shown below:

Dependent Variable: Tobin's Q-Ratio	Coefficients	Observations	Adjusted R-squared
VaRDI	-0.0239**	*593*	*0.4637*
	(-2.23)		
Period Dummy	-0.5047***		
	(-3.80)		
Period Dummy * VaRDI	-0.0178		
	(1.37)		
Emerging Country Dummy	-0.0575*		
	(-1.69)		
Emerging Country Dummy * VaRDI	0.0114		
	(0.71)		
Emerging Country Dummy * Period Dummy	0.5351**		
	(2.37)		
Log Size	-0.0254		
	(-0.66)		
Dividend Ratio	-0.0351***		
	(-3.30)		
Leverage Ratio	-0.0001*		
	(-1.93)		
Beta	-0.2655***		
	(-4.21)		
Return on Asset	0.0313*		
	(2.01)		
Constant	2.1121***		
	(5.44)		
Year Fixed Effects	Included		

Table 5.7 The Coefficients of Market Risk Information Disclosure (VaRDI), Period Dummy Related Variables and Country Dummy Related Variables for the Association Analysis between Market Valuation and Market Risk Information Disclosure

The table above shows the coefficients of the variables for market risk information disclosure (measured by the VaRDI), period dummy related variables and country dummy related variables. The period dummy variable defines the year before 2007 (including 2007) as 0 and the year after 2007 as 1. The emerging country dummy variable defines the bank originated from emerging country as 1 and the bank originated from developed country as 0. The dependent variable is the annual market valuation which is measured by Tobin's Q-Ratio. Besides these variables, the other control variables are log size, dividend ratio, leverage ratio, beta and return on asset that these control variables have been proven to be statistically significant variables in explaining the variation of market valuation. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The data panel is unbalanced. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

When *Dc* = 0 and *Dp* = 0, that is the case for the developed country before the financial crisis. Under this case, the only left variable is the VaRDI with the coefficient of -0.0239 at the 5% statistical significance. This result suggests that the market risk information disclosure is negatively associated with the market valuation for developed countries before the financial crisis that one score increase in the VaRDI is associated with a reduction in the market valuation around two hundredths with 5% statistical significance, all else being equal.

When *Dc* = 1 and *Dp* = 0, that is the case for the emerging country before the financial crisis. Under this case, there are three variables left which are *VaRDI, Dc* and *Dc*VaRDI*. The variable of *Dc*VaRDI* is not statistically significant, therefore this variable may be omitted from analysis. The result suggests that the disclosure of market risk information is negatively associated with the market valuation for emerging countries before the financial crisis, in which one score increase in the VaRDI is associated with a reduction in the market valuation by nearly two hundredths at the 5% statistical significance, all else being equal. Since the coefficient of emerging country dummy variable is -0.0575 at the 10% statistical significance, the market valuation in an emerging country is on average six hundredths lower than in a developed country before the financial crisis, all else being equal.

When *Dc* = 0 and *Dp* = 1, that is the case for the developed country after the financial crisis. Under this case, there are three variables left which are *VaRDI, Dp* and *Dp*VaRDI*. The variable of *Dp*VaRDI* is not statistically significant, and may be omitted from analysis. The results suggest that the disclosure of market risk information is negatively related to the market valuation for the developed country after the financial crisis, in which one score increase in the VaRDI is associated with a reduction in the market valuation by nearly two hundredths, all else being equal. The

market valuation after the financial crisis is on average fifty hundredths lower than before the financial crisis for the developed country.

When *Dc* = 1 and *Dp* = 1, that is the case for the emerging country after the financial crisis. Under this case, all the five variables are left. The variables of *Dp*VaRDI* and *Dc*VaRDI* are not statistically significant, therefore these two variables may be omitted from analysis. The result suggests that the market risk information disclosure is negatively associated with the market valuation for emerging countries after the financial crisis that one score increase in the VaRDI is associated with a reduction in the market valuation nearly two hundredths with 10% statistical significance, all else being equal. The intercept is changed by the combination of *Dp*, *Dc* and *Dp*Dc* and all the three variables are statistically significant at the 1% statistical significance, and the sum of these three coefficients is (-0.5047-0.0575+0.5351) which is equal to -0.0271. The average market valuation after the financial crisis is around three hundredths lower before the financial crisis for the emerging country.

When measuring the disclosure of operational risk information using the ORDI, the test statistic is $F_{m,n-k-1} = F_{3,593-11-1} = 16.2856$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $c_i = d_i = e_i = 0$ and suggests that there is a difference between emerging countries and developed countries for the association between the operational risk information disclosure and the market valuation. Therefore, this research takes a deep look at what kind of difference lying between emerging countries and developed countries for this association. The new coefficients and their corresponding t-ratios of the ORDI, the additive dummy variables, and the interaction dummy variables under the new model are shown below:

Dependent Variable: Tobin's Q-Ratio	Coefficients	Observations	Adjusted R-squared
ORDI	-0.0071	*593*	*0.4709*
	(-0.56)		
Period Dummy	-0.9917***		
	(-6.85)		
Period Dummy * ORDI	-0.0732		
	(-1.15)		
Emerging Country Dummy	-0.0655*		
	(-1.79)		
Emerging Country Dummy * ORDI	0.0166		
	(0.78)		
Emerging Country Dummy * Period Dummy	0.9376***		
	(4.51)		
Log Size	-0.0002		
	(-0.01)		
Dividend Ratio	-0.0367***		
	(-3.58)		
Leverage Ratio	-0.0001*		
	(-1.69)		
Beta	-0.3172***		
	(-5.12)		
Return on Asset	0.0310*		
	(1.66)		
Constant	1.7786***		
	(4.69)		
Year Fixed Effects	Included		

Table 5.8 The Coefficients of Operational Risk Information Disclosure (ORDI), Period Dummy Related Variables and Country Dummy Related Variables for the Association Analysis between Market Valuation and Operational Risk Information Disclosure

The table above shows the coefficients of the variables for operational risk information disclosure (measured by the ORDI), period dummy related variables and country dummy related variables. The period dummy variable defines the year before 2007 (including 2007) as 0 and the year after 2007 as 1. The emerging country dummy variable defines the bank originated from emerging country as 1 and the bank originated from developed country as 0. The dependent variable is the annual market valuation which is measured by Tobin's Q-Ratio. Besides these variables, the other control variables are log size, dividend ratio, leverage ratio, beta and return on assets that these control variables have been proven to be statistically significant variables in explaining the variation of market valuation. The sample period of Tobin's Q-Ratio is from the year 1997 to the year 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from the year 1996 to the year 2013. The regression analysis takes into account the year fixed effects. The data panel is unbalanced. The coefficient estimates are obtained using the ordinary least squares estimation. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

When $Dc = 0$ and $Dp = 0$, that is the case for the developed country before the financial crisis. Under this case, the only left variable is the ORDI with no statistical significance. Although this is not with statistical significance, this result still suggests that the

operational risk information disclosure is negatively associated with the market valuation for developed countries before the financial crisis that one score increase in the ORDI is associated with a reduction in the market valuation seven hundredths.

When *Dc* = 1 and *Dp* = 0, that is the case for the emerging country before the financial crisis. Under this case, there are three variables left which are *ORDI, Dc* and *Dc*ORDI*. The variable of emerging country dummy is statistically significant with a coefficient of -0.0655, meaning that the market valuation in the emerging country is six hundredths lower compared to developed countries, all else being equal.

When *Dc* = 0 and *Dp* = 1, that is the case for the developed country after the financial crisis. Under this case, there is one variable left which is *Dp* with statistical significance at 1% level. The market valuation after the financial crisis is on average one unit lower than before the financial crisis for developed countries.

When *Dc* = 1 and *Dp* = 1, that is the case for the emerging country after the financial crisis. Under this case, three variables are left which are *Dp, Dc* and *Dp*Dc*. The intercept is changed by the combination of *Dp, DC* and *Dp*Dc* and all these three variables are statistically significant, therefore the overall change of the intercept is (-9917-0.0655+0.9376) which is equal to -0.1196. The market valuation after the financial crisis is on average nearly eleven hundredths lower before the financial crisis for emerging countries.

In this section, this research intends to find any difference between developed countries and emerging countries for the association between the risk information disclosure (measured by the VaRDI or the ORDI) and the market valuation. Except the emerging country after the financial crisis that the operational risk information disclosure (measured by the ORDI) is not with statistical significance, the other

associations between the market risk information disclosure (measured by the VaRDI) and the market valuation or between the operational risk information disclosure (measured by the ORDI) and the market valuation are all significantly negative.

All else being equal, being an emerging country alone seems to have a lower market valuation compared to a developed country, which has been indicated by the significantly negative coefficient of emerging country dummy variable when X_i measures the market risk information disclosure via the VaRDI or the operational risk information disclosure via the ORDI.

5.8 Discussion

After controlling for the variable differences, the regression analysis suggests that the VaRDI and ORDI are significantly and negatively related to the market valuation of a bank. A further step of introducing dummy variables related to the financial crisis and the country development status has generally confirmed this finding.

The empirical finding in the current research is not in line with the general opinion which suggests a significantly positive relationship exists between information disclosure and market valuation. In previous research such as Bhattacharya et al. (2002) and Baumann and Nier (2003), the research period ends before the year 2005. After the year 2005, much more attention has been paid to risk regulation in the banking industry, and the global banking industry has gone through numerous reforms as well. This period difference between the current research and the previous research has probably caused the current empirical findings to deviate from the previous ones.

Baumann and Nier (2003) assert that increased information disclosure is helpful to increase the market valuation of a bank. The current research uses a very similar

methodology to that employed by Baumann and Nier (2003), and treats information disclosure as the independent variable and market valuation as the dependent variable. In this scenario, it is assumed that the difference in market valuation is due to the difference in information disclosure. Though the findings in Baumann and Nier (2003) in general have suggested that information disclosure by a bank is helpful in increasing the bank's market valuation, Baumann and Nier (2003) do find that the information disclosure about loans by maturity, deposits by maturity, and deposits by type of customer is in a negative relationship with the market valuation of a bank. Baumann and Nier (2003) suspect that the market expects the bank to have a maturity mismatch between loans and deposits, hence the bank is unable to increase its market valuation by disclosing more information about the maturity structure of assets and liabilities. Baumann and Nier (2003) argue that risk information disclosure regarding loans is beneficial for the banking industry, while risk information disclosure regarding interest rate risk is less likely to be beneficial for the banking industry. Therefore, policymakers should particularly encourage risk information disclosure with respect to loans.

The empirical results generated by Jordan et al. (1999) show that the increased information disclosure by banks during the period of the banking crisis in the US has had negative impacts on banks' stock price and banks' deposit ratio such that both the stock price and the deposit ratio would decline if the bank increases its information disclosure during the period of the banking crisis. Jordan et al. (1999) believe that the market have the ability to uncover a bank's problems through information disclosures, and the information disclosure by one bank may also has an impact on the market valuation of other similar banks. Given that our sample period has covered the 2008 financial crisis and the event study conducted previously has also indicated a negative

impact on stock price, the finding in the current research regarding the negative relationship between information disclosure and market valuation is in line with the finding of Jordan et al. (1999).

Meanwhile, an intriguing study by Helbok and Wagner (2006) seems to shed new light on the association between market valuation and information disclosure. Helbok and Wagner (2006) use regression analysis which puts the information disclosure as the dependent variable and puts the equity-to-asset ratio and profitability ratio as the independent variables. In this scenario, it is assumed that the difference in the level of information disclosure is due to the difference in the equity-to-asset ratio and profitability ratio. Their finding indicates that operational risk information disclosure by a bank is negatively associated with the bank's equity-to-book ratio and profitability ratio. A motivation and incentive theory is put forward to justify this negative association that a distressed bank tends to disclose more information with respect to operational risk in order to ease the anxiety of investors and assure the soundness of a bank's operation. Lang and Lundholm (1993) also put the information disclosure level as the dependent variable as Helbok and Wagner (2006) did, and put market valuation along with stock return and analyst forecast into the independent variables. However, Lang and Lundholm (1993) find a positive association between information disclosure level and market valuation. The empirical evidence provided by Lang and Lundholm (1993) regarding the association between information disclosure level and market valuation is in contradiction with Helbok and Wagner (2006), though both Lang and Lundholm (1993) and Helbok and Wagner (2006) argue that information disclosure is helpful in boosting firms' market valuation based on their own theories. Market valuation could be linked with the demand for a stock. Bhattacharya et al. (2002) find that an increase in earnings opacity is associated with a decrease in stock demand after

controlling other influences. This finding seems somehow in line with what the current research has found. Plumlee et al. (2015) find that enhanced environmental disclosure is generally beneficial for firms' market valuation, but there are still inconsistent results in their findings. Indeed, there exists mixed evidence in the association analysis between information disclosure and market valuation, though the previous research generally attempts to encourage the information disclosure by claiming that information disclosure is helpful to boost market valuation.

The additional robustness tests by considering the impacts of financial crisis and country development status have confirmed the negative association between risk information disclosure and market valuation. Furthermore, the robustness test shows that the financial crisis has a significantly detrimental impact on market valuation, which complies with intuition. The market valuation for the banking industry has been dramatically and persistently declined over the last decade. Calomiris and Nissim (2014) believe that the extent and persistence of decline in the market valuation of the banking industry cannot be explained by the delayed recognition of losses particularly caused by the financial crisis. Rather, the decline is the value of intangibles – such as customer relationship and market sentiment – along with other unrecognized contingent obligations. This downward shift in the market valuation reflects a combination of changed economic circumstances (e.g., low interest rate; mergence within the banking industry) and changed regulatory policies. Together, these changes in the economic environment after the financial crisis have affected the investors' relationship with the banking industry. The market perceptions when valuing banks to certain issues have also changed after the financial crisis. For example, prior to the financial crisis, higher leverage was associated with greater value, but during and after

the crisis, as default risk and regulatory concerns came to the fore, lower leverage turns out to be associated with greater value.

The robustness test also shows that before the financial crisis the market valuation for the banking industry in developed countries is higher than the market valuation for the banking industry in emerging countries, and after the financial crisis the market valuation for the banking industry in emerging countries is higher than the market valuation for the banking industry in developed countries. The market valuation for the banking industry in developed countries, therefore, has been negatively affected more severely by the impact of the financial crisis. Despite not directly addressing the differences of market valuation among countries, some papers may still give clues for the reason of market valuation differences among countries. For example, Errunza and Senbet (1984) demonstrate that costless international corporate intermediation through direct foreign investment facilitates the formation of a perfect market and brings down the barriers of international capital flows faced by investors. This cost efficiency movement is a positive factor in increasing market valuation which is caused by a closed international involvement. Lang et al. (2003) investigate the relationship between the cross-listing in the United States and the information disclosure of non-US firms, and find that firms that cross-listed on US markets have greater analyst coverage and increased forecast accuracy than firms which are not cross-listed on US markets. Lang et al. (2003) also find that a positive change in analyst coverage and forecast accuracy occurs around the time of cross-listing onto US markets. A higher market valuation is observed when the cross-listing happens. The movement of cross-listing onto US markets is viewed as complying with a strict and comprehensive standard of accounting information disclosure enforced by the US government. Bai et al. (2004) advocate that high concentration of outside shareholding and issuing shares

to foreign investors have positive effects on market valuation, while a large shareholding by interval investors such as CEOs or vice chairmen have negative effects on market valuation.

5.9 Summary

This chapter has investigated the association between risk information disclosures and market valuation in the banking industry. Two composite indices (VaRDI and ORDI) are used to measure the market risk and operational risk information disclosure respectively. Tobin's Q-Ratio is used to measure the market valuation of the banking industry. Since the correlation between the VaRDI and the ORDI is relatively high at 0.66, the disclosure index has been put to the test with the regression model one at a time in order to avoid the multicollinearity problem. Under the regression analysis by controlling variable differences, each of the two composite indices (VaRDI and ORDI) appears to be in a significantly negative relationship with the market valuation. Additional tests with respect to the impacts of financial crisis and country development status have generally confirmed this finding.

This empirical evidence implies that the risk information disclosure is negatively related to the market valuation of a bank meaning that an increase in information disclosure with exposures to the market and operational risk is associated with a reduction in the market valuation of a bank. However, this empirical argument is not in line with the claims in previous studies such as Baumann and Nier (2003), which argue that the information disclosure is associated with an increase in the market valuation of a bank, though the current research has used a similar methodology with Baumann and Nier (2003) to retest the association.

This empirical evidence triggers doubt regarding the positive association between information disclosure and market valuation, which encourages future research to further test this association. Meanwhile, the finding in the current research might also make individual banks to rethink their policies and reassess their risk information disclosure regimes, since the information disclosure about exposure to risk may be not that beneficial on market valuation in all conditions as suggested in previous studies, and the information disclosure about exposure to risk is also costly to produce in practice. On the other hand, maintaining a certain amount of risk information disclosures is crucial for monitoring risk in the banking industry. A task achieving a balance between these two issues might be laid out for banking managers in commercial banks and banking regulators in central banks collectively to think about.

Chapter 6

Does the Disclosure of Information about Exposure to Risk Mitigate Stock Return Volatility?

Empirical Evidence from the Banking Industry

6.1 Introduction

The relationship between information disclosure and stock return volatility is a debatable issue. Though the majority of studies suggest that increased information disclosures are associated with lower levels of volatility in stock returns (e.g. Lang and Lundholm, 1993; Baumann and Nier, 2004; Aman, 2011), there still exists evidence suggesting that increased information disclosures are associated with higher levels of volatility in stock returns (e.g. Ross, 1989; Kalev et al., 2004; Mugaloglu and Erdag, 2013). Indeed, what information disclosures will affect stock return volatility is clearly an important topic to revisit. The sample of the banking industry is employed to test this intriguing question.

The disclosures of market and operational risk information are measured by two indices: the Value-at-Risk disclosure index (VaRDI) designed by Perignon and Smith (2010) and the operational risk disclosure index (ORDI) designed by Goyal and Wu (2007). The original information regarding the market and operational risk is extracted from public documents such as annual reports and SEC[63] filings.

[63] SEC stands for the US Securities and Exchange Commission.

The remaining chapter is outlined as follows. Section two provides an introduction to the banking risk information disclosure and its potential to yield reductions in the volatility of bank's stock returns. The third section briefly outlines the indices used to measure the level and quality of disclosures for market and operational risk information in the banking industry. A more detailed description of these two indices is presented in chapter four. Section four introduces the regression analysis and the control variables employed in testing the impact of risk information disclosures on the volatility of bank's stock returns. Sample selection, sample period and data sources are presented in the fifth section. Section six presents the empirical results, while section seven provides additional robust tests with the impacts of financial crisis and country development status. Section eight discusses the results and compares the results with previous research. The final section summarizes this chapter and provides concluding comments.

6.2 Background and Literature Review

6.2.1 Background

This research is fundamentally important as the banking industry is crucial for economic stability. The impact of the 2008 financial crisis was huge and severely affected the global economy. While adventure is embedded into human nature and there is still a culture to encourage risk-taking for an extra return in the financial world, it is important that this risk-taking is carefully managed. In this sense, the banking industry is vulnerable to market and operational risks, so any disclosure that reduces the risk should be valuable to investors in making asset allocation decisions.

In order to facilitate the goal of providing increased safeguards to the banking system, the Basel Committee proposed the Basel Accord II in 2004 which is an updated

requirement for risk information disclosures over the provision of the previous Basel Accord I in 1988. The major difference between the first and the second Basel Accord is that the Basel Accord II adds the disclosures of market and operational risk to the mandatory monitoring, while the Basel Accord I only takes credit risk as the mandatory monitoring. Traditionally, the risk that a borrower fails to meet his contractual obligation to the lender was regarded as the biggest threat facing a bank. There has been relatively thorough discussion among the existing literature on credit risk and how to manage credit risk in the banking industry (e.g. Berger and Udell, 1990; Wong, 1997; Altman and Saunders, 1998; Jiménez and Saurina, 2004; Jiménez and Saurina, 2006, inter alias). After the 2008 financial crisis, central banks around the world emphasized the importance of information disclosures by suggesting the use of the Basel Accord as the benchmark in determining the quality and quantity of information disclosed by the banking industry. In some countries such as the US and Canada, the disclosure of market and operational risk information is no longer a voluntary procedure but a mandatory legal requirement.

6.2.2 Literature in Support of the Negative Relationship between Information Disclosure and Stock Return Volatility

Using the data from the Financial Analysts Federation, Lang and Lundholm (1993) find evidence suggesting a negative correlation between information disclosure and stock return volatility. In the multiple regression analysis, their dependent variable is the information disclosure level and the independent variables include stock return volatility, firm size, stock earning, and market valuation of equity. Besides a negative correlation between information disclosure and stock return volatility, the empirical results also show that the relationship between information disclosure level and firm size is positive implying that bigger firms generally disclose more information, and

the relationship between disclosure level and stock return is also positive implying that firms with positive stock returns generally disclose more information.

The volatility of stock returns can be illustrated by the sensitivity of trading volume to the changes in the financial environment. Linsmeier et al. (2002) compare the sensitivity of trading volume to the changes of economic variables before and after the company first released its FRR NO. 48[64] report. The set of economic variables considered by Linsmeier et al. (2002) includes inflation, interest rates, exchange rate, and energy prices. Linsmeier et al. (2002) prove that the sensitivity of trading volume to the changes of these economic variables is lower after the company released the FRR NO. 48. The absence of FRR NO. 48 makes the sensitivity of trading volume higher to the changes of these economic variables, since the information opacity leads to diversified opinions about these changes' impacts on stock price, which subsequently leads to higher stock return volatility. The information in the FRR NO. 48 helps investors to better analyse the financial status of a company and achieve similar opinions about the valuation of a company, which could stabilise the stock price of a company.

Baumann and Nier (2004) test the correlation between the information transparency level and the stock return volatility of 600 banks in 31 countries over the period 1993-2000. The transparency level is measured through three indices, and each of the three indices is a self-sufficient measurement of information transparency: the first one is an index composited by the Center for International Financial Analysis Research (CIFAR) which measures the transparency level for all industries globally in the 1990s; the

[64] The Financial Reporting Release NO. 48 (FRR NO. 48) is a mandatory disclosure required by the US Securities and Exchange Commission (SEC). The FRR NO. 48 mainly focus on the market risk information of a company.

second index is a dummy variable which identifies whether a bank is listed on the US stock market; the third index is designed by Baumann and Nier (2004) which contains items which may affect stock return volatility including loans by maturity, loans by type, loans by counterparty, problem loans, problem loans by type, securities by type, securities by holding purpose, deposits by maturity, deposits by type of customer, money market funding, long-term funding, reserves, capital, contingent liabilities, off-balance sheet items, non-interest income and loan loss provisions. Each of the three indices is individually regressed with additional control variables to test the relationship between stock return volatility and information disclosure. Baumann and Nier (2004) employ the ordinary least squares (OLS) regression to obtain the results, and the results show that in general, each of the three indices is significantly and negatively related to the stock return volatility. That is to say, a higher disclosure level is associated with a lower level of stock return volatility. A more specific regression analysis is conducted in order to further test the disclosure impacts of individual items. For the individual items composing the third index, information disclosures about securities by type, securities by holding period, deposits by type of customer, long-term funding, contingent liabilities, off-balance sheet items and non-interest income are all associated with reduced levels of stock return volatility.

The standard deviation of stock returns is one of the approaches to measure stock return volatility. After controlling for other bank characteristics such as company size, trading volume, profit, and operational situation, the regression analysis conducted by Hirtle (2007) suggests that the coefficient estimate for the disclosure index is statistically and significantly different to zero and negative in sign, which means that the bank stock return volatility is negatively correlated with the amount of information disclosed by a bank. The disclosure index is designed in a similar fashion to the index

designed by Pérignon and Smith (2010). As shown in equation (6.1), the volatility of stock i at time t+1 could be explained by the information disclosed at time t and a vector of control variables X. β_1 and β_2 are the corresponding coefficients for the disclosure index and the vector of control variables respectively. $\varepsilon_{i,t+1}$ is the error term of volatility for stock *i* at time *t+1*. Hirtle (2007) uses this regression model to provide evidence that enhanced information disclosures have a significant role in reducing the volatility of bank's stock returns.

$$Y_{i,t+1} = \beta_1 Disclosure\ Index_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t+1} \quad (6.1)$$

Ball (2009) finds that comprehensive information disclosure plays an important role in preventing the excessive volatility of stock returns. The stock price is efficient in a statistical sense if it is the minimum variance forecast of future stock price. A comprehensive information disclosure helps stock price to reflect its intrinsic value, which means that there will be minimal adjustments needed in future stock price to accommodate additional information release. However, if only partial information is disclosed, the current stock price will inefficiently reflect its intrinsic value. Therefore, the future stock price may require large movements to compensate for new information, which may lead to high levels of stock return volatility. Volatility is an underlying risk for market participants, hence sufficient information disclosure is very crucial for the stability of our financial system.

Aman (2011) explores the association between the public information of a firm and the stock return volatility of a firm through a sample of Japanese firms. The public information of a firm examines the credibility of a firm's information disclosures in terms of quality and quantity through the channel of media coverage. The empirical result suggests that greater amounts of media coverage are related to lower levels of

stock return volatility of a firm, in which this association is more significant for the media coverage of earnings report.

By using a sample of more than 90,000 firm observations over the period of 1962–2001, Rajgopal and Venkatachalam (2011) find that poor quality financial reporting is associated with higher levels of stock return volatility, which implies that enhanced financial reporting would mitigate information asymmetries of a firm's performance and reduce the stock return volatility of a firm. The control variables included in the test are cash flow operating performance, cash flow variability, stock return performance, growth, leverage and firm size. This empirical finding is robust even considering inter-temporal changes in information disclosures about value-relevant, inter-temporal changes in information disclosures about future cash flows, and differences in investors' professional level. This empirical finding is also applicable for various cases and scenarios including high-technology firms, new listing firms, firm-years with losses, financial distress, mergers and acquisitions.

Kim et al. (2014) investigate whether enhanced corporate social responsibility mitigates or contributes to stock price crash risk, in which the crash risk signals the severe stock return volatility. The corporate social responsibility is measured through seven categories which are diversity, community, corporate governance, environment, employee relations, human rights and products. The empirical result suggests that if firms commit to high standards of information transparency and comply with strict regulations, they would face a lower chance of crash risk. On the other hand, if firms commit to poor standards of information transparency and evade shareholders' scrutiny, they will face a higher chance of crash risk. This empirical evidence supports the mitigating effect of information disclosures on crash risk. Additionally, the mitigating effect of enhanced corporate social responsibility on crash risk is more

salient for firms which have less effective corporate governance such as the firm with a lower corporate rating. A similar analysis conducted by Harjoto and Jo (2015) by a sample of US public firms during the period 1993-2009 also confirms the finding of Kim et al. (2014), which indicates that overall intensified corporate social responsibility disclosures would reduce the analyst dispersion of earnings forecasts and subsequently reduce stock return volatility. However, the mitigating effect of enhanced corporate social responsibility on stock return volatility is barely observed for the firms with higher standards of accounting and financial disclosures.

Bushee and Friedman (2016) produce evidence that higher-quality information disclosures are associated with lower levels of stock return volatility. The underlying reason for this might be less sensitive moods of investors. Higher quality information disclosures mitigate the investor's mood sensitiveness through pointing noise investors to trade towards information-based analysis and facilitating sophisticated investors in arbitrage activities. In addition, since the noise transactions deviate the stock price from its fundamental value, information disclosure plays an important role in enhancing market efficiency by reducing these noise transactions.

6.2.3 Literature in Contradiction to the Negative Relationship between Information Disclosure and Stock Return Volatility

There also exists evidence which suggests that increased information disclosure is associated with higher levels of stock return volatility. Ross (1989), Kim and Verrecchia (1991), and Atiase and Bamber (1994) argue that, in an informationally efficient market, increased information disclosure has the potential to bring about increased stock return volatility. Kalev et al. (2004) employ firm news announcements as the proxy for information arrival and investigates the information–volatility

relationship by a sample of Australian companies. The empirical result by Kalev et al. (2004) reveals a significantly positive relationship between the amount of news arrivals and the stock return volatility, even after controlling for potential impacts of trading volume and opening volatility. This empirical finding of the positive relationship is in favour of the argument which suggests that information disclosure would increase stock return volatility. By combining the use of event study and regression analysis, Bailey et al. (2006) investigate the changes of stock return volatilities and trading volumes for non-US firms listed on the US stock market before and after these non-US firms complied with US market regulations, in which complying with US market regulations is considered as the step of improved information disclosures. Bailey et al. (2006) find that both the stock return volatility and the trading volume have been significantly increased after these non-US firms complied with US market regulations. Complying with US market regulations sometimes needs these non-US firms to alter the composition of ownership and this action is suspected to disperse the interpretation of company performance. A higher trading volume would be unavoidable if there are dispersed interpretations of company performance. Bailey et al. (2006) conclude that enhanced information disclosures would hardly give these non-US firms listed on the US markets any meaningful benefit in terms of mitigating stock return volatility. Mugaloglu and Erdag (2013) use the GARCH (1, 1) model to test the impact of public disclosures on stock return volatility. On the contrary to the initial expectation of the mitigating effect of public disclosures on stock return volatility, Mugaloglu and Erdag (2013) find that the stock return volatility is, in reality, escalated by increased corporate disclosures.

Additionally, through the regression analysis by controlling the variables of trading volume, size, dividend yield, earning-to-price ratio, book-to-price ratio and stock

rating, Bushee and Noe (2000) find that higher information disclosure has almost no effect on a company's stock return volatility in the long term, whilst in the short term an improvement in disclosure by a company has the power to increase its stock return volatility. Bushee and Noe (2000) believe that there are two types of investors (institutional investor vs transient investor)[65] in the market whose actions could affect stock return volatility, and these two types of investors have opposite impacts on stock return volatility. The net effects of these two types of investors on stock return volatility cancel out in the long term, which means that increased information disclosures have no impact on stock return volatility in the long term. Transient investors respond more quickly and more aggressively than institutional investors, which is the key reason of increased stock return volatility in the short term. Therefore, Bushee and Noe (2000) make the caveat of the short-term impact for the company managers when considering to increase information disclosures of their companies.

Moreover, Lee and Liu (2011) argue that the relationship between information disclosure and stock return volatility is either U-shaped or negative. The information disclosure of a company measured by Lee and Liu (2011) includes trading information, price impact, analyst earning forecast error, analyst earning forecast dispersion, trading history, and institutional ownership. Two control variables are included in the analysis which are firm profitability and size.

[65] One type of investors is the institutional investor who is attracted to the company with a higher level of information transparency, and the institutional investor favours the company with a higher level of information transparency. The institutional investor is generally a long-term investor who helps to decrease stock return volatility. The other type of investors is the transient investor who holds a short-term investment strategy towards the newly disclosed information, therefore the transient investor increases stock return volatility.

6.3 Measuring Risk Information Disclosure

A highly relevant paper in tackling the relationship between information disclosure and stock return volatility in the banking industry is Baumann and Nier (2004). Baumann and Nier (2004) have focused on a broad aspect of information disclosures for the banking industry including loans by maturity, loans by type, loans by counterparty, problem loans, problem loans by type, securities by type, securities by holding purpose, deposits by maturity, deposits by type of customer, money market funding, long-term funding, reserves, capital, contingent liabilities, off-balance-sheet items, noninterest income and loan loss provisions. This research focuses on the newly requirements concerning risk information disclosures outlined in the Basel Accord II for the banking industry, namely the market risk information disclosure and the operational risk information disclosure. The disclosures of market and operational risk information are measured by the Value-at-Risk disclosure index (VaRDI) designed by Perignon and Smith (2010) and the operational risk disclosure index (ORDI) designed by Goyal and Wu (2007) respectively.

6.3.1 VaRDI: An Index to Quantify Market Risk Information Disclosure

The VaRDI is an index proposed by Perignon and Smith (2010) to measure the disclosure of market risk information in the banking industry. A comprehensive discussion regarding the VaRDI can be seen in section 4.3 or in Perignon and Smith (2010). Briefly, the VaRDI has 6 categories which monitor 6 facets of the VaR reporting quantity and quality. The theoretical score of VaRDI ranges from 0 (minimum) to 15 (maximum).

1. VaR characteristics (maximum 2 points): 1 point – the holding period (e.g. 1 day, 1 week), 1 point – the confidence level (e.g. 95%, 99%).

2. VaR statistics (maximum 4 points): 1 point – the high, low or average VaR, 1 point – the year-end VaR, 1 point – the VaR risk category (e.g. currency, option, equity), 1 point – considering the diversification effect.

3. Intertemporal comparison (maximum 1 point): 1 point – compared with the previous year VaR.

4. Daily VaR graph (maximum 2 points): 1 point – the histogram about daily VaRs, or 2 points – the plot of daily VaRs[66].

5. Trading revenues (maximum 4 points): 1 point – the hypothetical revenue, 1 point – the revenues deducted from the trading costs, 1 point – the histogram of daily revenues or 2 points – the plot of daily revenues[67].

6. Back-testing (maximum 2 points): 1 point – the number of exceptions or 2 points – zero exception, 1 point – the explanation of exceptions.

6.3.2 ORDI: An Index to Quantify Operational Risk Information Disclosure

The ORDI is an index originally proposed by Goyal and Wu (2007) to measure the disclosures of operational risk information. A comprehensive discussion regarding the ORDI is provided in section 4.4 or in Goyal and Wu (2007). The ORDI has 5 categories which monitor 6 facets of the reporting quantity and quality of operational risk. The theoretical score of ORDI ranges from 0 (minimum) to 15 (maximum).

1. Recognition and definition of operational risk (maximum 3 points): 1 point – recognition and definition of operational risk as a risk exposure, 1 point – recognition

[66] If a bank releases both the histogram and the plot of daily VaRs at the same time, the VaRDI will not allocate 1 point to 4a and 2 points to 4b, instead it only allocate to each category 4a and 4b 1 point respectively. The maximum points for the category of daily VaR graph will not exceed 2 points.
[67] If a bank releases both the histogram and the plot of daily revenues at the same time, the VaRDI will not allocate 1 point to 5c and 2 points to 5d, instead it only allocate to each category 5c and 5d 1 point respectively. The maximum points for the category of daily VaR graph will not exceed 4 points.

and definition of reputational risk as a risk exposure, 1 point – recognition and definition of legal risk as a risk exposure.

2. Operational risk capital (maximum 3 points): 1 point – operational risk capital reported in percentage terms or 2 points – operational risk capital reported in currency terms, 1 point – the calculation method of operational risk capital explained under Basel II.

3. Intertemporal comparison (maximum 1 point): 1 point – operational risk capital reported for previous years.

4. Governance (maximum 3 points): 1 point – operational risk responsibility adopted into the governance structure, 1 point – reputational risk responsibility adopted into the governance structure and 1 point – legal risk responsibility adopted into the governance structure.

5. Methodology/reporting (maximum 5 points): 1 point – operational risk measurement or assessment methodology, 1 point – reputational risk measurement or assessment methodology, 1 point – legal risk measurement or assessment methodology, 1 point – operational loss data collection process, 1 point – operational risk internal reporting procedure.

6.4 Research Design

6.4.1 Measuring Stock Return Volatility

An accurate measurement of stock return volatility is crucial for the evaluation and implementation of asset pricing as well as trading and hedging strategies. The traditional way of measuring the lagged stock return volatility is the standard deviation of stock returns. Andersen and Bollerslev (1998) state that the traditional standard

deviation of stock returns has explained little of the variation and provided a crude measurement for the ex-post volatility. An accurate forecast of volatility needs a more precise model in obtaining the past return volatility. A newly quadratic model that the realized volatility discussed by Andersen et al. (2001), and Barndorff-Nielsen and Shephard (2002) provides a superior explanation of asset return volatility compared to the traditional standard deviation model. Andersen et al. (2003) find that the realised volatility does a good job in measuring volatility especially in studies employing high-frequency data such as intraday data. Andersen et al. (2005) argue that the realised volatility is not only useful for the measurement of volatility in the ex-post observations but also useful for the estimation of the latent volatility in the future. Shown by equation (6.2), the realised variance at time t where the time t could be a minute, a day, a month, or a year is calculated as the sum of squared returns over the intervals within the period t. The sub-period interval may be shortened by enlarging M, and when M approaches infinitely, the interval size approaches zero[68]. The realised volatility is simply the square root of realised variance.

$$Realised\ Variance_t = \sum_{j=1}^{M} r_{t,j}^2 \tag{6.2}$$

$$Realised\ Volatility_t = \sqrt{Realised\ Variance_t} \tag{6.3}$$

It is stated by Mandelbrot (1966) that financial asset returns are leptokurtic, and have displayed significant volatility clustering and persistence in which a high volatility period is likely to be followed by a high volatility period, and vice versa. Therefore, Engle (1982), Bollerslev et al. (1992), and Bollerslev et al. (1994) have proposed and empirically tested the Autoregressive Conditional Heteroskedastic (ARCH) model for

[68] Andersen and Bollerslev (1998) state that in theory, as the interval increases to infinitesimal, the measurement would converge to the genuine measurement of the latent volatility, however in practice, this is infeasible when considering data limitation, market microstructure features, nonsynchronous trading pattern, discrete price observations, bid-ask spreads, etc.

forecasting the volatility of asset returns. Shown in equation 6.4, the stock return variance at time t depends upon a constant term β_0 along with other lagged stock return variance till time (*t-i*). Furthermore, an enhanced model of ARCH – Generalized ARCH (GARCH) is proposed by Bollerslev (1986). Shown in equation 6.5, $\sum_{i=1}^{p} \alpha_i \, \varepsilon_{t-i}^2$ is often called the ARCH term which obtains the impacts of lagged shocks or innovations in stock returns, and $\sum_{i=1}^{q} \beta_i \, \sigma_{t-i}^2$ is often called the GARCH term which obtains the lagged stock return variance. Furthermore, Andersen et al. (2001) find that the autocorrelation within realised volatilities is very strong, hence the underlying theory of ARCH/GARCH model is still plausible for the realised volatility, which suggests that the current volatility is affected by the previous volatility.

$$\sigma_t^2 = \beta_0 + \sum_{i=1}^{n} \beta_i \, \varepsilon_{t-i}^2 \tag{6.4}$$

$$\sigma_t^2 = \omega_0 + \sum_{i=1}^{p} \alpha_i \, \varepsilon_{t-i}^2 + \sum_{i=1}^{q} \beta_i \, \sigma_{t-i}^2 \tag{6.5}$$

In the current research, the stock return volatility is on an annual basis and measured by the realised volatility. The data of weekly stock price is used to get the annual realised volatility. The log-return is employed in estimating the realised volatility, where log-return is calculated as $r_{i,t} = \ln(p_{i,t} / p_{i,t-1})$ that $p_{i,t}$ is the stock price at time t which has been adjusted for the payments of dividends, and $r_{i,t}$ is the stock return at time t.

6.4.2 The Empirical Framework

This research aims to investigate the relationship between information disclosure about exposure to risk and stock return volatility using regression analysis. The stock return volatility is the dependent variable and measured by the realised volatility, while the disclosures of risk information for market and operation are independent variables

that are regressed into the regression model one at a time due to the concern of the multicollinearity problem, in which the disclosures of risk information for market and operation are quantified by the indices VaRDI and ORDI respectively.

Other than the independent variables of information disclosures, several control variables are included in previous literature as additional independent variables to explain the variation of stock return volatility. A similar test conducted by Baumann and Nier (2004) grasps bank size, dividend ratio, cost-income ratio, leverage ratio, loan growth, loan ratio, return on assets and beta as control variables. Huang et al. (2011) add the variables of return on asset (ROA), debt ratio, firm size, export ratio and turnover rate in the empirical test for the correlation analysis between stock return volatility and corporate governance. Rajgopal and Venkatachalam (2011) control the variables of operating performance, stock return performance, size, book-to-market ratio and leverage in the empirical test for the correlation analysis between financial reporting quality and stock return volatility. Besides the variables regarding company structure, Lee and Liu (2011) add the control variables of company profitability and size along with the level of information availability of a firm to test the impact of information disclosures on stock return volatility. Lamoureux and Lastrapes (1990) find that trading volume has a significant explanatory power for stock return variance. Similar to the finding in Lamoureux and Lastrapes (1990), the research conducted by Chen et al. (2001) and Linsmeier et al. (2002) suggests that there is a dynamic relationship between stock return volatility and trading volume, in which stock return volatility could cause the change of trading volume and trading volume could also cause the change of stock return volatility. Bollerslev and Mikkelsen (1996) state that there is a mean-reverting phenomenon in stock return volatility in which highly volatile movements in stock returns would slowly decay and dissipate in the long term,

hence the ARCH/GARCH model will be more efficient in function by employing the recent lag terms. Most commonly, one period lagged stock return volatility is added as an explanatory variable to explain the current stock return volatility (e.g. Kalev et al., 2004; Kasman et al., 2011; Li et al., 2011). Several macroeconomic variables including industrial production, real retail sales, money supply, exchange rate and inflation have been considered to add into the ARCH/GARCH model in order to improve the fitness of the model by Morelli (2002), but the explanatory power of these selected macroeconomic variables is disappointedly weak, which implies that including macroeconomic models in the volatility analysis especially under the concept of ARCH/GARCH is not essential. Khlif and Hussainey (2016) find that corporate size, leverage ratio, and profitability and risk factor are potential variables affecting risk reporting. As the risk reporting under the current research refers to the VaRDI or ORDI index, it is worth taking some of these potential variables into account when running regressions to find the relationship between stock return volatility and risk reporting. Corporate size and leverage ratio are common factors affecting stock return volatility, which are also identified by other papers. Profitability could be measured by the return on asset variable.

Combing the ideas of the control variables in the previous literature which may affect stock return volatility, this research employs nine firm-characteristic control variables along with the firm lagged stock return volatility into the regression model. The firm-characteristic control variables are bank size, dividend ratio, cost-to-income ratio, leverage ratio, loan growth, loan ratio, return on asset, beta and trading volume. The logarithm of total asset considers the factor of bank size that may capture the potential economic scale, in which smaller banks are likely to experience higher stock return volatility than larger banks. Higher dividend ratio may indicate higher future cash

flows that would have a mitigating effect on stock return volatility. Dividend ratio could signal the quality of a bank that would also affect the stock return volatility of a bank. However, the research conducted by Baskin (1989) and Campbell and Hentschel (1992) indicates that the announcement of dividend could possibly trigger higher stock return volatility. The bank with higher dividend ratio might have more dividend announcements than the bank with lower dividend ratio, which could lead to higher stock return volatility for the bank with higher dividend ratio. Higher cost-to-income ratio suggests that the bank is operating inefficiently, therefore higher cost-to-income ratio may lead to higher stock return volatility. On the other hand, higher return on asset suggests good operating status of a bank and may lead to lower stock return volatility. The loan ratio and the loan growth signal the potential risk of a bank and its future growth. The leverage ratio is an indebted status reflecting the bank's solvency issue, though this ratio is not important if the Modigliani-Miller theorem[69] is being held. Beta is a measurement of the riskiness of a bank that would affect the stock return volatility of a bank, since the stock return volatility is often caused by investors' uncertainty about the underlying asset risk. Higher trading volume is often related to higher stock return volatility. The concept of ARCH/GARCH suggests that the current stock return volatility depends upon previous stock return volatility, hence including the lagged stock return volatility would improve the explanatory power of the model. Furthermore, time differences are taken into account here. The Hausman test will perform later in order to choose between the year random effects and the year fixed

[69] The Modigliani–Miller theorem is a theory about capital structure in modern finance. The theory states that under certain market price situation such as the classical random walk, with the absence of taxes, agency costs, bankruptcy costs, and asymmetric information, and in an efficient market, the value of a firm is unaffected by how the firm is financed, since the value of the firm depends on neither its approach nor its dividend policy to raise capital (issuing stock or selling debt). The Modigliani–Miller theorem is also called the capital structure irrelevance principle. Two firms which are identical except for their financial structures, one is financed by equity only, and the other one is leveraged that is financed partly by equity and partly by debt. The Modigliani–Miller theorem argues that the values of these two firms are exactly the same.

effects. The model is shown below, where u is the constant term, all the firm-characteristic control variables are included in vector z, σ stands for the stock return volatility, X is the disclosure index (VaRDI or ORDI), and ε is the error term.

$$\sigma_{i,t} = u_{i,t} + \beta_i Z_{i,t-1} + \eta_i \sigma_{i,t-1} + \gamma_i X_{i,t-1} + year\ effects^{70} + \varepsilon_{it} \qquad (6.6)$$

6.5 Data

6.5.1 Research Sample

This research chooses the world's top sixty banks as the sample to look at the impact of risk information disclosure on stock return volatility. The rank of the world's top sixty banks[71] are based on their asset size at the end of 2013. While most of the world's top sixty banks are listed on various stock exchanges, there are ten banks among this group not being listed on the stock market for various reasons. These ten unlisted banks[72] are mainly small banks, though some large banks are not being listed on the stock market. The possible reason for the large bank not being listed is that the large bank is newly established through mergence and has not fully prepared to go into the market like Group BPCE[73]. Therefore, the sample employed excludes any unlisted banks and covers the remaining fifty listed banks.

[70] The Hausman test will perform later in order to choose between the year random effects and the year fixed effects.

[71] Further information regarding the rank of the world's top sixty banks can be traced through the website http://www.relbanks.com/worlds-top-banks/assets-2013.

[72] The ten banks out of the top sixty not listed on the market are: Japan Post Bank (from Japan, ranked 13th), Groupe BPCE (from France, ranked 18th), Rabobank Group (from Netherlands, ranked 29th), Postal Savings Bank of China (from China, ranked 30th), Credit Mutuel Group (from France, ranked 32nd), Norinchukin Bank (from Japan, ranked 36th), KfW Group (from Germany, ranked 46th), DZ Bank AG (from Germany, ranked 55th), La Caixa Group (from Spain, ranked 59th), and Cassa Depositi e Prestiti (from Italy, ranked 60th).

[73] As a result of the 2007 financial crisis, Caisse Nationale des Caisses D'épargne (CNCD) and Banque Fédérale des Banques Populaires (BFBP) merged in 2009 to become the second largest bank in France known as Group BPCE.

6.5.2 Research Sample Period

The time period of VaRDI and ORDI is from 1996 to 2013, since the earliest available online public report is around the year 1996[74] which defines the starting period of our sample. The corresponding period of stock return volatility is from 1997 to 2014.

6.5.3 Data Sources

The market risk information and the operational risk information are measured by the designed indices VaRDI and ORDI. Both the VaRDI and the ORDI extract the data from banks' public documents. This research has mainly fetched up the original public documents from three sources:

- Bank official websites, which contain the original annual reports and the related crucial information.
- http://www.sec.gov/ which is the U.S. Securities and Exchange Commission official website. The data stream of the website contains 10-K[75], 10-Q[76] and 20-F[77] forms for American companies.
- https://bankscope.bvdinfo.com/ which is the database specially designated for the banking industry containing comprehensive information about banks, such as the original annual reports of 11,000 worldwide banks.

[74] The year 1996 and the year 1997 have only limited data, which is why chapter 4 has not included these two years in the research to look at the information disclosure status among the world's top banks.
[75] The 10-K form is an annual comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the listed American company.
[76] The 10-Q form is a quarterly comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the listed American company.
[77] The 20-F form is a comprehensive financial report required by the U.S. Securities and Exchange Commission to give shareholders detailed information about the listed foreign company.

The stock price, dividend ratio, cost-to-income ratio, loan ratio, leverage ratio, beta, loan growth, return on asset and trading volume related to these banks are all obtained from datastream[78].

6.6 Empirical Results

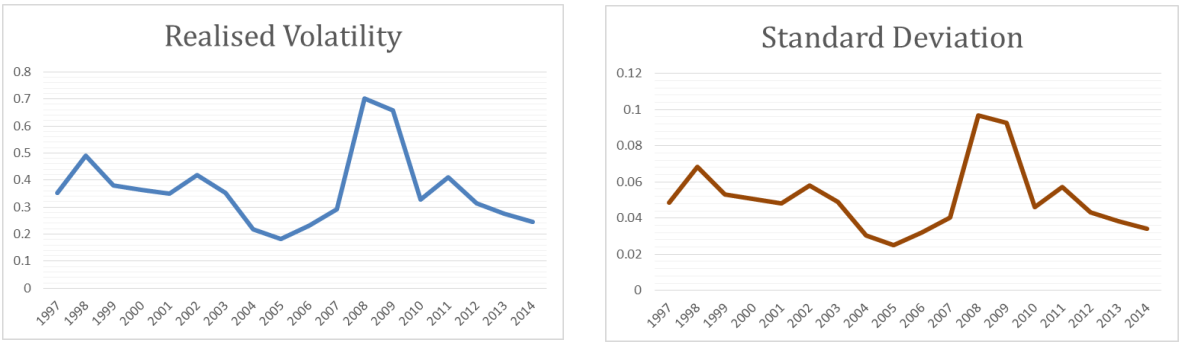

Figure 6.1 The Plot of the Average Annual Stock Return Volatility

The two lines above plot the average annual stock return volatilities using the methods of realised volatility and standard deviation respectively for all the sixty banks during the period 1997-2014. The realised volatility and the standard deviation are both calculated through weekly stock returns. These sixty banks are the world's largest sixty banks ranked by asset size in 2013. The data panel is unbalanced.

Since the stock return volatility could be also measured using the standard deviation, two comparable lines depicting the average realised volatility and the average standard deviation are drawn across all the top sixty banks during the period 1997-2014. There is no visual difference between the shapes of these two lines. A statistical correlation check confirms the visual institution which indicates that the correlation between the realised volatility and the standard deviation is 0.997. This highly correlated statistical ratio between the realised volatility and the standard deviation has additionally proven the suitable status of the realised volatility to replace the standard deviation when measuring the stock return volatility. Considering the approximation of these two volatility measurements and the accuracy of realised volatility suggested by the

[78] Datastream is a database for the financial and economic research data provided by Thomson Reuters.

previous research, the current research adopts the realised volatility as the only approach to measure the stock return volatility.

As indicated by the figure above, the stock return volatility is particularly high for the year 2008 and 2009, which is in line with the tumultuous event of the 2008 financial crisis.

	Obs	Mean	Std. Dev.	25th Percentile	Median	75th Percentile
Dependent Variable						
Realised Volatility	783	0.37	0.21	0.22	0.32	0.45
Disclosure Variables						
VaRDI	758	6.43	4.76	0.00	7.00	11.00
ORDI	758	5.86	4.13	2.00	6.00	9.00
Control Variables						
Log Size	810	8.97	0.79	8.57	8.90	9.26
Dividend Ratio	783	3.33	2.87	1.65	3.13	4.44
Cost-to-Income Ratio	782	6.52	72.95	2.99	4.52	7.91
Loan Ratio	690	55.06	15.25	44.92	57.91	66.10
Leverage Ratio	809	555.00	926.47	266.63	430.99	759.54
Beta	768	1.28	0.52	0.67	1.08	1.53
Loan Growth	706	15.29	65.14	1.28	8.28	16.95
Return on Asset	696	1.20	1.40	0.67	1.08	1.53
Trading Volume (in million)	763	5491.00	19000.00	809.00	2289.00	9358.00

Table 6.1 The Statistical Summary of Variables Used in the Stock Return Volatility Analysis

The table above demonstrates the basic statistical description of variables used in this research for the 50 banks around the world. The 50 banks are selected from the world's top 60 banks (by asset size in 2013), in which the selection criteria take account of whether the bank has been listed on the market and whether the bank has appropriate data assisting the analysis. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The properties of the data which are mean, standard deviation, 25^{th} percentile, median, and 75^{th} percentile are displayed accordingly to each data type. The annual stock return volatility is calculated by the annual realised volatility, in which the annual realised stock return volatility is calculated through weekly stock returns.

6.6.1 Firm-Characteristic Control Variables in the Stock Return Volatility Analysis

	Log Size	Dividend Ratio	Cost-to-Income Ratio	Loan Ratio	Leverage Ratio	Beta	Loan Growth	Return on Asset	Trading Volume
Log Size	1.00								
Dividend Ratio	-0.04	1.00							
Cost-to-Income Ratio	0.03	0.04	1.00						
Loan Ratio	-0.21	0.12	0.00	1.00					
Leverage Ratio	-0.03	0.03	0.03	-0.12	1.00				
Beta	0.14	-0.16	-0.03	-0.30	0.03	1.00			
Loan Growth	-0.03	-0.05	0.00	-0.01	0.00	-0.01	1.00		
Return on Asset	-0.07	-0.08	-0.04	0.35	0.00	-0.11	0.08	1.00	
Trading Volume	0.39	-0.02	-0.15	0.10	-0.16	0.06	-0.01	0.02	1.00

Table 6.2 The Correlation among the Control Variables Used in the Stock Return Volatility Analysis

The table above shows the correlations among the firm-characteristic control variables used in the stock return volatility analysis. The sample period of the control variables is from 1997 to 2014, in which the control variables are related to the fifty listed banks out of the world's top sixty banks.

Table 6.1 shows the summary statistics for all the variables used in the stock return volatility analysis. In order to avoid the multicollinearity problem among these control variables, the correlations among them are tested and shown in table 6.2. The correlations between these control variables are weak, which suggests that there is no evidence of a potential multicollinearity problem across these control variables.

Dependent Variable: Realised Volatility	Coefficients	
Log Size	-0.0031	
	(-1.53)	
Dividend Ratio	0.0103*	0.0123*
	(1.72)	(1.67)
Cost-to-Income Ratio	-0.0002***	-0.0002***
	(-3.29)	(-3.33)
Loan Ratio	0.0000	
	(0.03)	
Leverage Ratio	0.0000	
	(0.13)	
Beta	0.0967***	0.0961***
	(7.24)	(8.32)
Loan Growth	0.0000	
	(-0.19)	
Return on Asset	-0.0172**	-0.0183*
	(-2.17)	(-1.75)
Trading Volume	0.0000	
	(0.70)	
Lagged Realised Volatility (-1)	0.3854***	0.3905***
	(9.75)	(10.62)
Constant	0.0660	0.0912
	(0.78)	(1.53)
Year Fixed Effects	Included	Included
Observations	*566*	*566*
Adjusted R-Squared	*0.622*	*0.617*

Table 6.3 The Coefficients of the Control Variables in the Stock Return Volatility Regression Analysis

The table above shows the coefficients of the control variables and the one-period lagged realised volatility in the stock return volatility regression analysis. The dependent variable is the annual realised volatility which is calculated using the return data sampled on a weekly interval. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively. The first column contains all the control variables in the regression analysis, and the second column only includes the significant control variables from the first column into the regression analysis.

In table 6.3, the first column shows a general model that includes all the control variables along with the lagged stock return volatility, in which the dependent variable is the annual realised volatility which is calculated using weekly stock returns. This regression model is based on the ordinary least squares (OLS) method. Furthermore,

this regression has taken into account the time differences, in which the Hausman test rejects the null hypothesis of the year random effects leading to the year fixed effects.

The current research deletes those insignificant control variables from the model. The significant control variables are retained and the coefficients regarding the parsimonious model are shown in the second column of table 6.3. The signs of these variables in the parsimonious model are consistent with those in the general model. By including only the control variables with statistical significance in the regression analysis, this research makes the estimation model more efficient that several papers such as Berman et al. (1999) and Baumann and Nier (2004) also modify the model in this way.

6.6.2 The Effect of Risk Information Disclosure on Stock Return Volatility

Dependent Variable: Realised Volatility	Coefficients	Dependent Variable: Realised Volatility	Coefficients
VaRDI	**-0.0035*** **	**ORDI**	**-0.0041*** **
	(-3.04)		**(-2.72)**
Dividend Ratio	0.0122	Dividend Ratio	0.0126
	(1.09)		(1.29)
Cost-to-Income Ratio	-0.0002***	Cost-to-Income Ratio	-0.0003**
	(-3.36)		(-3.15)
Beta	0.1077***	Beta	0.1022***
	(8.61)		(8.39)
Return on Asset	-0.0108*	Return on Asset	-0.0129**
	(-1.77)		(-2.06)
Lagged Realised Volatility (-1)	0.3589***	Lagged Realised Volatility (-1)	0.3707***
	(8.85)		(9.24)
Constant	0.1143	Constant	0.1192*
	(1.03)		(1.79)
Year Fixed Effects	Included	Year Fixed Effects	Included
Observations	*566*	***Observations***	*566*
Adjusted R-squared	*0.6257*	***Adjusted R-squared***	*0.6243*

Table 6.4 The Coefficients of the Variables in the Stock Return Volatility Regression Analysis

The table above shows the coefficients of the variables in the stock return volatility regression analysis. The dependent variable is the annual realised volatility which is calculated through weekly stock returns. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into

account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. Both of the regressions include the control variables into analysis, in which the parsimonious model is used to introduce the control variables. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

In order to assess the effect of risk information disclosure on stock return volatility, the risk information disclosure indices (VaRDI and ORDI) are placed into the parsimonious model. Since the correlation between VaRDI and ORDI is relatively high at 0.66, the VaRDI and the ORDI are placed into the model one at a time to avoid the multicollinearity problem. The parsimonious model concludes five explanatory variables which are dividend ratio, cost-to-income ratio, beta, return on asset and lagged realised volatility. The empirical results are shown in table 6.4, which turns out that the risk information disclosure (VaRDI or ORDI) is negatively associated with the stock return volatility. One score increase in the VaRDI is associated with around four thousandth reduction in the stock return volatility, while one score increase in the ORDI is also associated with around four thousandth reduction in the stock return volatility. Except for the variable of dividend ratio, all the control variables have shown a statistical significance in explaining the variation of stock return volatility and maintained their signs as the same in the previous parsimonious model.

6.7 The Robustness Test

6.7.1 The Impact of Global Financial Crisis

The existing empirical evidence is based on a sample gathered over the period 1997 to 2014. One crucial concern is the impact of the financial crisis which happened in 2007/2008 on the validity of empirical results. There exists observed evidence in previous research which indicates that the stock market volatility is abnormally high in certain historical periods. Schwert (1989) notes that the stock return volatility is

extremely high during the Great Recession of 1929-1939 in the US that this amplified market fluctuation is unable to be explained by any stock valuation model. As shown in figure 6.1, the year 2008 and the year 2009 have experienced abnormally high volatility compared to other years. Whether the volatility caused by the financial crisis has an impact on our results is a worthwhile issue to be tackled. This research adopts a standard approach by introducing a dummy variable which tests for the effect of the exogenous shock of the financial crisis. The financial crisis dummy variable Df takes unity for 2008 and 2009 and takes the value 0 for other years.

This research adds the financial crisis dummy variable and its interaction variable with the disclosure index into the previous estimation model (equation 6.4). The new equation is shown below, where the dependent variable is still the realised volatility in which symbolled by σ, u is the constant term, Z is the vector of firm-characteristic control variables which include dividend ratio, cost-to-income ratio, beta and return on asset, X stands for the disclosure index (VaRDI or ORDI), the additive financial crisis dummy variable is Df, and ε is the error term.

$$\sigma_{i,t} = u_{i,t} + \beta_i Z_{i,t-1} + \eta_i \sigma_{i,t-1} + \gamma_i X_{i,t-1} + a_i Df_t + b_i Df_t X_{i,t-1} + year\ fixed\ effects + \varepsilon_{it} \qquad (6.7)$$

If the financial crisis has a significant impact on the stock return volatility, it will potentially change the intercept by an amount of a_i or potentially change the coefficient of disclosure index by an amount of b_i or both. If the coefficient of disclosure index changed, the association between risk information disclosure and stock return volatility would be affected[79].

[79] The main effect variable and the interaction variable could be analyzed separately if the statistically significant levels between them are different.

So in order to test whether the financial crisis has impacted the relationship, a joint hypothesis test is performed. The null hypothesis is written as $H_0: a_i = b_i = 0$ while the alternative hypothesis is $H_1: H_0$ is false. If the F-test[80] fails to reject the null hypothesis, it means that the financial crisis has no statistically significant role to play in this model. If the F-test rejects the null hypothesis, it means that the financial crisis is statistically significant in this model. In this scenario, this research will go further to see whether and how the association between the risk information disclosure and the stock return volatility has been affected by the financial crisis. This technique is in principle an altered Chow test to determine whether this is a stable regression model for the whole period.

When X_i measures the information disclosure about exposure to the market risk via the VaRDI, the test statistic is $F_{m,n-k-1} = F_{2,566-8-1} = 169.58$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $H_O: a_i = b_i = 0$ and suggests that the financial crisis has caused a structural change in the original model (equation 6.4). The coefficients and their corresponding t-ratios of VaRDI and other explanatory variables under the new model are shown below:

[80] In the Analysis of Variance (ANOVA), the F-test can be used to assess whether the combined impact of a subset of independent variables has a significant impact on the dependent variable. The equation of F-test can be written as $F_{m,n-k-1} = \frac{(RRSS-URSS)/m}{URSS/(n-k-1)}$, where RRSS stands for the Residual Sum of Squares for the Restricted model, URSS stands for the Residual Sum of Squares for the Unrestricted model, m is the number of restricted variables, n is the number of total observations, and k is the number of all independent variables.

Dependent Variable: Realised Volatility	Coefficients	Observations	Adjusted R-squared
VaRDI	-0.0048***	*566*	*0.7578*
	(-3.20)		
Financial Crisis Dummy	0.2702***		
	(2.68)		
Financial Crisis Dummy * VaRDI	0.0061		
	(1.51)		
Dividend Ratio	0.0026		
	(0.81)		
Cost-to-Income Ratio	-0.0002**		
	(-7.16)		
Beta	0.1155***		
	(3.36)		
Return on Asset	-0.0104		
	(-1.51)		
Lagged Realised Volatility (-1)	0.3160***		
	(2.93)		
Constant	0.0850**		
	(2.02)		
Year Fixed Effects	Included		

Table 6.5 The Coefficients of the Market Risk Information Disclosure (VaRDI) and the Financial Crisis Dummy Related Variables for the Association Analysis between Stock Return Volatility and Market Risk Information Disclosure

The table above shows the coefficients of the variables of market risk information disclosure (measured by the VaRDI) and the coefficients of other related variables in the stock return volatility regression analysis. The financial crisis dummy variable defines the year 2008 and 2009 as unity and other years as the value 0. The dependent variable is the annual realised stock return volatility. Besides the variables of VaRDI, financial crisis dummy, and financial crisis dummy*VaRDI, the other explanatory variables are dividend ratio, cost-to-income ratio, beta, return on asset and lagged realised volatility. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

Table 6.5 can be compared to the VaRDI part of table 6.4. In table 6.4, the coefficient of VaRDI is -0.0048, which suggests that over the whole sample period 1997–2014, the operational risk information disclosure is negatively associated with the stock return volatility of a bank. In table 6.5, after the inclusion of the additive and the interaction dummy variables, the empirical result shows that the coefficient of VaRDI continues to be negative and the coefficient of VaRDI is also statistically significant at 1% level. That is to say, the market risk information disclosure is associated with a

reduction in the stock return volatility even after considering the exogenous shock of the financial crisis. When the financial crisis dummy variable is equal to one, it raises the stock return volatility by an amount of three tenths approximately and this impact is statistically significant at 1% level. That is to say, during the period 2008-2009, the stock return volatility is higher than other years which is in compliance with intuition. The coefficient of interaction dummy variable (financial crisis dummy*VaRDI) is not statistically significant which may be omitted from analysis.

When X_i measures the information disclosure about exposure to the operational risk via the ORDI, the test statistic is $F_{m,n-k-1} = F_{2,581-8-1} = 187.54$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $H_0: a_i = b_i = 0$ and suggests that the financial crisis has caused a structural change of the original model (equation 6.4). The coefficients and their corresponding t-ratios of ORDI and other explanatory variables under the new model are shown below:

Dependent Variable: Realised Volatility	Coefficients	Observations	Adjusted R-squared
ORDI	-0.0058***	*566*	*0.7762*
	(-3.96)		
Financial Crisis Dummy	0.2942***		
	(3.23)		
Financial Crisis Dummy * ORDI	0.0040		
	(1.14)		
Dividend Ratio	0.0036		
	(1.30)		
Cost-to-Income Ratio	-0.0002**		
	(-6.38)		
Beta	0.1178***		
	(3.24)		
Return on Asset	-0.0135*		
	(-1.72)		
Lagged Realised Volatility (-1)	0.3028***		
	(2.68)		
Constant	0.0904**		
	(2.17)		
Year Fixed Effects	Included		

Table 6.6 The Coefficients of the Operational Risk Information Disclosure (ORDI) and the Financial Crisis Dummy Related Variables for the Association Analysis between Stock Return Volatility and Market Risk Information Disclosure

The table above shows the coefficients of the variables of operational risk information disclosure (measured by the ORDI) and the coefficients of other related variables in the stock return volatility regression analysis. The financial crisis dummy variable defines the year 2008 and 2009 as unity and other years as the value 0. The dependent variable is the annual realised stock return volatility. Besides the variables of ORDI, financial crisis dummy, and financial crisis dummy*ORDI, the other explanatory variables are dividend ratio, cost-to-income ratio, beta, return on asset and lagged realised volatility. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

Table 6.6 can be compared to the ORDI part of table 6.4. In table 6.4, the coefficient of ORDI is -0.0058, which suggests that over the whole sample period 1997 – 2014, the operational risk information disclosure is negatively associated with the stock return volatility of a bank. In table 6.5, after the inclusion of the additive and the interaction dummy variables, the empirical result shows that the coefficient of ORDI continues to be negative and the coefficient of ORDI is also statistically significant at 1% level. That is to say, the operational risk information disclosure is associated with a reduction in the stock return volatility even after considering the exogenous shock of the financial crisis. When the financial crisis dummy variable is equal to one, it raises the stock return volatility by an amount of three tenths approximately and this impact is statistically significant at 1%. That is to say, during the period 2008-2009, the stock return volatility is higher than other years which is in compliance with intuition. The coefficient of interaction dummy variable (financial crisis dummy*ORDI) is not statistically significant which may be omitted from analysis.

This section has solved one crucial concern about the potential impact of the financial crisis on the association analysis between the risk information disclosure (measured by the VaRDI or ORDI respectively) and the stock return volatility, and found that the financial crisis has played a significant impact which has significantly brought up the

stock return volatility. Additionally, this research maintains its initial finding regarding the VaRDI and ORDI which suggests that the risk information disclosures with regards to market and operation are associated with reductions on the stock return volatility. The impact of reduction in the stock return volatility by risk information disclosures becomes more statistically apparent after considering the financial crisis.

6.7.2 The Impact of Country Development Status

In the previous section, this research has investigated whether the financial crisis has played a significant role in the association analyse by adding financial crisis related dummy variables into the initial estimation models. The result shows that the financial crisis has significantly increased the stock return volatility, which complies with intuition. Additionally, the risk information disclosures continue to be negatively associated with the stock return volatility and the reduction power is more statistically significant after including the financial crisis related variables.

In this section, this research continues to explore another potential dummy factor which may affect the associations by using the same technique in the previous section. This country dummy variable Dc divides the sample into two parts, which is the developed country denoted as the value 0 and the emerging country denoted as the value 1.

The banks in the current research sample are from sixteen countries worldwide, in which most of the countries are developed: Australia, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, the UK and the USA. There are fourteen banks from emerging countries: China, Russia, and Brazil. Emerging countries are assumed to be different from developed countries in terms of information transparency, legal system comprehensiveness, financial market

regulation, and maturity, etc. Whether these assumed differences have made any impact on these associations are discussed below.

This research has proved that the financial crisis dummy related variables have a combined significance when adding to equation 6.4, which means that equation 6.5 in hypothesis is an efficient model, therefore this research will adopt equation 6.5 as the new baseline model. In order to test whether there is any difference for the association between emerging countries and developed countries, this research adds the emerging country dummy variable and its interaction variable which is the interaction term between emerging country dummy variable and disclosure index (VaRDI or ORDI) into equation 6.5. The new equation is shown below, where the dependent variable is still the realised volatility symbolled by σ, u is the constant term, Z is the vector of firm-characteristic control variables which include dividend ratio, cost-to-income ratio, beta and return on asset, X stands for the disclosure index (VaRDI or ORDI), the additive financial crisis dummy variable is Df, the country development dummy variable is Dc, and ε is the error term.

$$\sigma_{i,t} = u_{i,t} + \beta_i Z_{i,t-1} + \eta_i \sigma_{i,t-1} + \gamma_i X_{i,t-1} + a_i Df_t + b_i Df_t X_{i,t-1} + c_i Dc_t + d_i Dc_t X_{i,t-1} + e_i Dp_t Dc_t + year\ fixed\ effects + \varepsilon_{it} \quad (6.8)$$

If the three new added variables (Dc_t, $Dc_t * X_{i,t-1}$ and $Dc_t * Dp_t$) are not statistically redundant in equation 6.6, it will have the power to alter the intercept and the coefficient of information disclosure index. There are four different cases if equation 6.6 holds: emerging country without the financial crisis, emerging country during the financial crisis, developed country without the financial crisis and developed country during the financial crisis.

Firstly, in order to test whether the three newly added variables are statistically redundant, a joint hypothesis test is performed. The model associated with the null hypothesis restricts the coefficients ($c_i, d_i \; and \; e_i$) of additive dummy variable and interaction dummy variables to zero. If the F-test[81] fails to reject the null hypothesis, it means that the three newly added variables are statistically redundant. In this scenario, this research will finish the test and conclude the finding that there is no difference for the association between emerging countries and developed countries. If the F-test rejects the null hypothesis, it means that the country dummy related variables have played a role in this model. In this scenario, this research will take a further look to see the difference between developed countries and emerging countries for the association analysis.

When X_i measures the information disclosure about exposure to the market risk via the VaRDI, the test statistic is $F_{m,n-k-1} = F_{3,566-11-1} = 17.8922$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $c_i = d_i = e_i = 0$ and suggests that there is a difference between emerging countries and developed countries for the association between the market risk information disclosure and the stock return volatility. Therefore, this research takes a further look at what kind of difference lying between emerging countries and developed countries for the association. The new coefficients and their corresponding t-ratios for VaRDI and other explanatory variables are shown below:

[81] In the Analysis of Variance (ANOVA), the F-test can be used to assess whether the combined impact of a subset of independent variables has a significant impact on the dependent variable. The equation of F-test can be written as $F_{m,n-k-1} = \frac{(RRSS-URSS)/m}{URSS/(n-k-1)}$, where RRSS stands for the Residual Sum of Squares for the Restricted model, URSS stands for the Residual Sum of Squares for the Unrestricted model, m is the number of restricted variables, n is the number of total observations, and k is the number of all independent variables.

Dependent Variable: Realised Volatility	Coefficients	Observations	Adjusted R-squared
VaRDI	-0.0010	*566*	*0.7723*
	(-0.74)		
Financial Crisis Dummy	0.3244***		
	(7.55)		
Financial Crisis Dummy * VaRDI	0.0009		
	(0.26)		
Emerging Country Dummy	0.0488***		
	(2.62)		
Emerging Country Dummy * VaRDI	0.0024		
	(0.61)		
Emerging Country Dummy * Financial Crisis Dummy	-0.1392		
	(-0.91)		
Dividend Ratio	0.0017		
	(0.29)		
Cost-to-Income Ratio	-0.0002**		
	(-6.35)		
Beta	0.1304***		
	(3.99)		
Return on Asset	-0.0155*		
	(-1.91)		
Lagged Realised Volatility (-1)	0.2837**		
	(2.44)		
Constant	0.0455		
	(1.31)		
Year Fixed Effects	Included		

Table 6.7 The Coefficients of Market Risk Information Disclosure (VaRDI), Financial Crisis Dummy Related Variables and Country Dummy Related Variables for the Association Analysis between Stock Return Volatility and Market Risk Information Disclosure

The table above shows the coefficients of the variables of market risk information disclosure (measured by the VaRDI) and the coefficients of other related variables in the stock return volatility regression analysis. The financial crisis dummy variable defines the year 2008 and 2009 as unity and other years as the value 0. The emerging country dummy variable defines the bank originated from emerging country as 1 and the bank originated from developed country as 0. The dependent variable is the annual realised stock return volatility. Besides the variables of VaRDI, financial crisis dummy, financial crisis dummy*VaRDI, emerging country dummy, emerging country dummy*VaRDI and emerging country dummy*financial crisis dummy, the other explanatory variables are dividend ratio, cost-to-income ratio, beta, return on asset and lagged realised volatility. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

As shown in table 6.7, by adding the emerging country dummy related variables, the coefficient of VaRDI remains negative in explaining the variation of stock return volatility, which suggests that the market risk information disclosure is associated with

a reduction in the stock return volatility even after considering the exogenous shock of the financial crisis and the difference of country development status. The coefficient of the financial crisis dummy variable is positively significant which again confirms the intuition that the financial crisis has exacerbated the stock return volatility. The coefficient of emerging country dummy variable is 0.0488 with statistical significance at 1% level, which suggests that all else being equal the stock return volatility of a bank in emerging countries is on average around five-hundredths higher than in developed countries. All interactions related to these dummy variables are not statistically significant which may be omitted from analysis.

When X_i measures the information disclosure about exposure to the operational risk via the ORDI, the test statistic is $F_{m,n-k-1} = F_{3,566-11-1} = 22.9534$ with the corresponding P-value 0.0000. This test result strongly rejects the null hypothesis $c_i = d_i = e_i = 0$ and suggests that there is a difference between emerging countries and developed countries for the association between the operational risk information disclosure and the stock return volatility. Therefore, this research takes a further look at what kind of difference lying between emerging countries and developed countries for the association. The new coefficients and their corresponding t-ratios for ORDI and other explanatory variables are shown below:

Dependent Variable: Realised Volatility	Coefficients	Observations	Adjusted R-squared
ORDI	-0.0047**	*566*	*0.7661*
	(-2.25)		
Financial Crisis Dummy	0.3449***		
	(6.37)		
Financial Crisis Dummy * ORDI	0.0005		
	(0.09)		
Emerging Country Dummy	0.0731***		
	(2.96)		
Emerging Country Dummy * ORDI	0.0018		
	(0.32)		
Emerging Country Dummy * Financial Crisis Dummy	-0.0926		
	(-0.74)		
Dividend Ratio	0.0040*		
	(1.67)		
Cost-to-Income Ratio	-0.0002***		
	(-6.32)		
Beta	0.1393***		
	(4.19)		
Return on Asset	-0.0175**		
	(-2.18)		
Lagged Realised Volatility (-1)	0.254**		
	(2.18)		
Constant	0.0674*		
	(1.88)		
Year Fixed Effects	Included		

Table 6.8 The Coefficients of Operational Risk Information Disclosure (ORDI), Financial Crisis Dummy Related Variables and Country Dummy Related Variables for the Association Analysis between Stock Return Volatility and Operational Risk Information Disclosure

The table above shows the coefficients of the variables of operational risk information disclosure (measured by the ORDI) and the coefficients of other related variables in the stock return volatility regression analysis. The financial crisis dummy variable defines the year 2008 and 2009 as unity and other years as the value 0. The emerging country dummy variable defines the bank originated from emerging country as 1 and the bank originated from developed country as 0. The dependent variable is the annual realised stock return volatility. Besides the variables of ORDI, financial crisis dummy, financial crisis dummy*ORDI, emerging country dummy, emerging country dummy*ORDI and emerging country dummy*financial crisis dummy, the other explanatory variables are dividend ratio, cost-to-income ratio, beta, return on asset and lagged realised volatility. The sample period of the realised volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

As shown in table 6.8, by adding the emerging country dummy related variables, the coefficient of ORDI remains negative and statistically significant in explaining the variation of stock return volatility, which suggests that the operational risk information

disclosure is associated with a reduction in the stock return volatility even after considering the exogenous shock of the financial crisis and the difference of country development status. The coefficient of the financial crisis dummy variable is positively significant, which again confirms the intuition that the financial crisis has exacerbated the stock return volatility. The coefficient of emerging country dummy variable is 0.0731 with statistical significance at 1% level, which suggests that all else being equal the stock return volatility of a bank in emerging countries is on average around seven-hundredths higher than in developed countries. All interactions related to these dummy variables are not statistically significant which may be omitted from analysis.

This section aims to find any difference between developed countries and developing countries for the association between the risk information disclosure (measured by the VaRDI or ORDI) and the stock return volatility. It turns out that those banks from an emerging country display higher average stock return volatility than banks from developed countries, all else being equal. The financial crisis again has been proven to elaborate the stock return volatility significantly, which complies with intuition. Most importantly, it confirms that risk information disclosures have mitigating impacts on the stock return volatility even after considering the exogenous shock of the financial crisis and the difference of country development status.

6.7.3 Re-Estimating Stock Return Volatility via the GARCH (1, 1) Model

As shown in equation 6.5, the variance of asset returns could be explained by the GARCH model which assumes that the current variance of asset returns (σ_t^2) is a weighted function of a long-term average value (ω_0), information about volatility during the previous periods ($\sum_{i=1}^{p} \alpha_i \, \varepsilon_{t-i}^2$) and the variance from the model during the previous periods ($\sum_{i=1}^{q} \beta_i \, \sigma_{t-i}^2$).

In order to further test the robustness of the existing evidence, this part will re-estimate the stock return variance of those banks by employing the GARCH (1, 1) model, in which the conditional variance is calculated based on the one-period ahead relevant information. The square root of the stock return variance calculated by the GARCH (1, 1) model will be placed into equation 6.8 as the stock return volatility ($\sigma_{i,t}$) for bank *i* in year *t*. By doing so, a new set of panel data will be established for the regression analysis. The regression analysis has concluded the selected control variables and taken account of the impact of the financial crisis and the difference of country development status.

Dependent Variable: Conditional Volatility	Coefficients	Dependent Variable: Conditional Volatility	Coefficients
VaRDI	**-0.0012**	**ORDI**	**-0.0035****
	(-0.85)		**(-2.14)**
Financial Crisis Dummy	0.2971***	Financial Crisis Dummy	0.3264***
	(6.56)		(7.49)
Financial Crisis Dummy * VaRDI	0.0011	Financial Crisis Dummy * ORDI	-0.0014
	(0.28)		(-0.34)
Emerging Country Dummy	0.0687***	Emerging Country Dummy	0.0652***
	(3.47)		(2.99)
Emerging Country Dummy * VaRDI	0.0008	Emerging Country Dummy * ORDI	0.0003
	(0.24)		(0.09)
Emerging Country Dummy * Financial Crisis Dummy	-0.1024***	Emerging Country Dummy * Financial Crisis Dummy	-0.1164***
	(-2.62)		(-3.23)
Dividend Ratio	0.0059***	Dividend Ratio	0.0062***
	(3.15)		(3.28)
Cost-to-Income Ratio	-0.0002***	Cost-to-Income Ratio	-0.0002**
	(-2.78)		(-2.52)
Beta	0.1102***	Beta	0.1111***
	(9.06)		(9.24)
Return on Asset	-0.0155***	Return on Asset	-0.0179**
	(-2.69)		(-3.05)
Lagged Conditional Volatility (-1)	0.4257***	Lagged Conditional Volatility (-1)	0.4137***
	(12.12)		(12.08)
Constant	0.0126	Constant	0.0296
	(0.53)		(1.26)
Year Fixed Effects	Included	Year Fixed Effects	Included
Observations	*566*	***Observations***	*566*
Adjusted R-squared	*0.7618*	***Adjusted R-squared***	*0.7785*

Table 6.9 The Coefficients of the Variables in the Stock Return Volatility (measured via the GARCH (1, 1) Model) Regression Analysis

The table above shows the coefficients of the variables in the stock return volatility regression analysis. The financial crisis dummy variable defines the year 2008 and 2009 as unity and other years as the value 0. The emerging country dummy variable defines the bank originated from emerging country as 1 and the bank originated from developed country as 0. The dependent variable is the annual conditional stock return volatility estimated via the GARCH (1, 1) model. The sample period of the volatility is from 1997 to 2014, and the sample period of the index (VaRDI or ORDI) and the control variables is from 1996 to 2013. The regression analysis takes into account the year fixed effects. The coefficient estimates are obtained using the ordinary least squares estimation. The data panel is unbalanced. The robust t-

statistic is in parenthesis. ***, **, and * denote statistical significance at 1%, 5%, and 10% level respectively.

Similar to previous tests, in order to avoid the multicollinearity problem between the VaRDI and ORDI, these two indices are regressed into the model one at a time. The empirical results are shown in table 6.9, which turns out that the risk information disclosure (VaRDI or ORDI) is negatively associated with the stock return volatility, though only the association between the stock return volatility and the operational risk information disclosure is with statistical significance. One score increase in the ORDI is associated with around four thousandth reduction in the stock return volatility. All the control variables have played the same roles in affecting the stock return volatility when comparing with the previous tests.

Since the coefficient of the financial crisis dummy variable is negative and statistically significant under either of the regressions, it indicates that the 2008 financial crisis has played a powerful role in escalating stock return volatility, which is complied with intuition and the previous robustness tests. Since the coefficient of the emerging country dummy variable is positive and statistically significant under either of the regressions, it indicates that those banks from emerging countries display higher average stock return volatility than banks from developed countries, all else being equal, which is also complied with the previous robustness tests. As the coefficient of the interaction dummy variable (financial crisis dummy*VaRDI or financial crisis dummy*ORDI) is negative and statistically significant, which suggests that the financial crisis has hit those banks in emerging countries relatively light compared to developed countries, all else being equal.

This section has further confirmed the previous findings by re-estimating stock return volatility via the GARCH (1, 1) model. Similar to before, the empirical results show

that the risk information disclosure has mitigated the stock return volatility, the financial crisis has raised the stock return volatility, while banks originated from emerging countries have a higher stock return volatility compared to banks originated from developed countries.

6.8 Discussion

The empirical evidence conducted in the current research shows that the information disclosures with exposures to the market and operational risk are associated with lower levels of stock return volatility. After considering the exogenous shock of the financial crisis and the difference of country development status, and re-estimating stock return volatility via the GARCH (1, 1) model, this negative association between risk information disclosures and stock return volatility remains.

This empirical finding supports the view that information disclosures have a mitigating effect on stock return volatility (e.g. Lang and Lundholm, 1993; Baumann and Nier, 2004; Aman, 2011). The suspected reason for the mitigating effect on stock return volatility by enhanced information disclosures is reduced uncertainty especially with the avoidance of one-time news shock. Alexander (1991) notices that a firm with a legal settlement is likely to disclose more information in a timely manner, as the firm tries to avoid a one-time big change in stock price caused by the legal settlement.

Whilst the literature providing supportive evidence for the mitigating effect of increased information disclosures on stock return volatility, there still exists evidence in conflict with this argument (e.g. Ross, 1989; Atiase and Bamber, 1994; Kalev et al., 2004) which claims that increased information disclosure has the potential to exacerbate stock return volatility. The literature in support of this view believes that the market itself only responds to the newly arrived information if the market is

informationally efficient. No-arbitrage martingale analysis is used by Ross (1989) to study the effect of changes in the rate of information flow on asset prices, in which this kind of analysis is firstly applied to developing asset pricing tools under a continuous time setting. In an arbitrage-free economy, stock return volatility is directly related to the rate of information flow to the market, therefore Ross (1989) claims that information flow elaborates stock return volatility.

Besides these two opposite arguments, the research conducted by Leuz and Verrecchia (2000) and Bushee and Noe (2000) provides evidence stating that a higher level of information disclosure has nearly no impact on a company's stock return volatility. Leuz and Verrecchia (2000) test the companies that voluntarily adopt the international accounting standards to see whether the adoption of international accounting standards has brought any benefit to these companies. The international accounting standard is typically regarded as a high requirement of accounting information disclosure, which is highly valued by investors. Two significant changes of the adoption are reductions in bid–ask spread and increments in daily stock turnover. However, there is no significant change with regard to share price volatility. Bushee and Noe (2000) investigate whether a firm's disclosure practices affect the composition of its institutional investor ownership and its stock return volatility, which indicates that firms with higher AIMR disclosure[82] rankings tend to have greater institutional ownership, but the institutional investors attracted by greater information disclosure have played no role in affecting stock return volatility.

By looking at the risk information disclosures from the banking industry, the current research suggests that enhanced information disclosures are associated with lower

[82] It is an annual measurement of the level of information disclosure practices published by the Association for Investment and Management Research (AIMR).

levels of stock return volatility and adds weight to the argument claiming that information disclosure mitigates stock return volatility. Another contribution point is that the data period has spanned over nearly twenty years and included the turbulent period of the 2008 financial crisis, which provides much more time updated and financial crisis related empirical evidence.

During the robustness test, the empirical evidence also shows that emerging countries are on average having higher stock return volatility than developed countries. De Santis (1997) demonstrates that the level of volatility in emerging markets is significantly higher than that of most developed markets. However, the exposure to high country-specific risk does not necessarily appear to be rewarded with higher expected returns. A higher risk-reward relation is detected in the emerging markets of Latin America but not in the emerging markets of Asia. A certain level of international integration and liberalization is formed in emerging markets, but there is no evidence showing that the market integration and liberalization increases stock return volatility. The event study of credit rating changes conducted by Kaminsky and Schmukler (2002) shows that fragile and enclosed financial markets are affected more severely by the changes of credit ratings, and a downgrade credit rating would normally cause higher market volatility than an upgrade credit rating. Rashid Sabri (2004) shows that emerging markets are unstable compared to developed markets, especially emerging markets need more time to recover from price deep falling compared to developed markets. The empirical results provided by Chiou et al. (2010) show that the stocks in emerging countries have higher stock return volatility than the ones in developed countries. Pointed out by Chiou et al. (2010), besides the difference of economy development, one suspected reason for the difference of the stock return volatilities between emerging countries and developed countries is legal system. The financial

markets in countries governed by the English common law are less risky and more mean-variance efficient than the countries governed by the civil laws. Moreover, the stock return volatility in the countries governed by the French–Spanish civil law is significantly higher than any other civil law countries. Countries governed by Scandinavian civil law have the best risk-adjusted return performance among all the civil law countries. The empirical results show that high quality of legal system, strong legal protection of investors' rights, and reliable social/political environment are related to lower stock volatility and higher risk-return performance. Li et al. (2011) indicate that the stock return volatility in emerging markets could be mitigated by introducing large foreign ownerships especially the ownership originated from developed countries, which provides indirect evidence indicating the higher stock return volatility in emerging markets. The underlying implication for global investors is that they should carefully compose their mean-variance investment portfolio when entering the emerging markets. Even though De Santis (1997) claims that the return-to-risk relation is uncertain in emerging markets, Hassan et al. (2003) suggest that the inclusion of assets from emerging markets into the diversified investment portfolio will at least reduce the portfolio risk even if it does not increase the expected return. Moreover, Hassan et al. (2003) point out that the correlation of the stock return volatilities between emerging countries and developed countries is relatively low compared to the correlation of the stock return volatilities among developed countries, in which the contagion effect is more obvious among developed countries.

6.9 Summary

This chapter has investigated the association between risk information disclosure and stock return volatility in the banking industry, in which the risk information stands for

the market risk information or the operational risk information. Two composite indices (VaRDI and ORDI) are used to measure the risk information disclosures respectively. The annual stock return volatility is calculated by the realised volatility, in which the realised volatility is calculated from weekly stock returns. Under the regression analysis by controlling the lagged volatility and firm-characteristic variables, both of the two composite indices (VaRDI and ORDI) turn out to be in a negative relationship with stock return volatility, which suggests that enhanced risk information disclosure has a mitigating impact on stock return volatility. Further robustness tests have all confirmed this finding by considering the exogenous shock of the financial crisis and the difference of country development status, and re-estimating stock return volatility via the GARCH (1, 1) model. This research provides additional and up-to-date evidence to the debatable issue regarding the impact of information disclosures on stock return volatility. Additionally, since this research is focused on the banking industry, banking policymakers around the world can use this finding as an incentive to build a more transparent and less volatile business environment.

Chapter 7

Conclusion

7.1 Summary

This thesis investigates issues surrounding information disclosures in the banking industry. Selection of the banking industry as the research proxy to investigate the impacts of information disclosures reflects the important role the banking industry plays in our economy.

Chapter 2 contextualises the thesis by surveying the issues surrounding banking information disclosures. Through the survey, this research has been informed about the important role of banking information disclosure in maintaining systemic stability and the status of banking information disclosure over the past few decades.

Chapter 3 provides a general picture of the short-term impact of banking information disclosure on stock price using the event study. Annual report disclosure is used as the occasion to conduct the event study. The empirical result suggests that on average there is a negative impact on stock price by the release of annual reports in the banking industry over the period 1997-2014, which implies that the market generally views the information within the annual reports as bad news over the period 1997-2014. Moreover, the negative response to the annual report release exhibits a time-lagged manner, which is unable to support the efficient market hypothesis. Two suspected reasons are proposed to explain the time-lagged manner. One is drawn from the behaviour perspective, which suggests that the market is, in general, reluctant to accept

bad news and thus needs more time to assimilate bad news into stock pricing. The other is the intuitive speculation, which assumes that the depth and amount of information in banks' annual reports needs more time and effort to be digested by the market compared to a relatively simple feature event such as dividend payment or stock split.

Chapter 4 narrows down the research scope by focusing on the risk information disclosure status in the banking industry. As the 2008 financial crisis derived from the banking industry is still within living memory, focusing on risk information disclosures in the banking industry is especially meaningful in the sense that it helps to build a safer business environment. In addition, compared to the Basel Accord I, which only specifies the disclosure of credit risk information in the banking industry, the newly proposed Basel Accord II incorporates the disclosures of market and operational risk information into regulations. Therefore, this research pays particular attention to the disclosure status of market and operational risk information in the banking industry. This research adopts the Value-at-Risk disclosure index (VaRDI) from Pérignon and Smith (2010) to measure market risk information disclosure in the banking industry, and adopts the operational risk disclosure index (ORDI) from Goyal and Wu (2007) to measure operational risk information disclosure in the banking industry. The values of the VaRDI and ORDI suggest that the banking industry around the world moves towards enhanced risk disclosures over the period 1996-2013. Meanwhile, developed economies are still in the leading position of risk information disclosures compared to emerging economies.

Chapter 5 investigates the relationship between market valuation (measured by Tobin's Q-Ratio) and risk information disclosures (measured by the VaRDI and ORDI) in the banking industry and finds that there is a negative relationship between them.

Additional robustness tests which take account of the impacts of financial crisis and country development status have confirmed the finding.

Chapter 6 investigates the relationship between stock return volatility (measured by the realised stock return volatility) and risk information disclosures (measured by the VaRDI and ORDI) in the banking industry, and finds that there is a negative relationship between them. Additional robustness tests which take account of the impacts of financial crisis and country development status have confirmed the finding.

7.2 Contributions and Implications

There is a dearth of research investigating the short-term impact of annual report release on stock price by the event study. This research fills the gap by providing an interesting perspective on the short-term impact of annual report release, and finds that the annual report release could have a significant impact on stock price. Investors in the market can treat the finding as a potential 'calendar effect' and manage their risks more carefully around the date of annual report release. Moreover, the lagged response to the annual report release brings us more to think about market behaviours when processing complicated information and the definition of market efficiency.

In response to the call from the Basel Committee for enhanced information disclosure in the banking industry for the purpose of building a safer business environment, this research helps to provide a comprehensive picture of the information disclosure status regarding the market and operational risks in the world's top banks. It appears that all over the world the banking industry has increased their risk disclosures over the past two decades. The central banks in emerging countries, however, should make more efforts to implement the regulations from the Basel Accord and encourage the banks they supervise to disclose more in-depth risk information, since both the quality and

quantity of risk information disclosure in emerging countries still lags behind compared to developed countries.

Contrary to the general finding in previous research, which suggests that increased information disclosure is associated with higher market valuation, both the event study and the regression analysis in this research have triggered doubts about the previous finding. In particular, the current research has used a similar methodology to that of Baumann and Nier (2003) in testing the association between information disclosure and market valuation, but the current research has not been able to find the significantly positive association between information disclosure and market valuation suggested by Baumann and Nier (2003). The argument that increased information disclosure is helpful to boost market valuation probably omits the nature of the information (bad news or good news), and the banks in the studying period of the argument were filled with good news, which leads to a biased conclusion.

The negative relationship identified between information disclosure and stock return volatility provides additional and up-to-date evidence to the debatable issue whether increased information disclosure is helpful to mitigate market volatility. Additionally, since this research is focused on the banking industry, banking policymakers around the world can use this finding as further evidence and an incentive to build a more transparent and less volatile business environment.

7.3 Limitations and Future Research

The research scope of the current study has only covered the banking industry with its market and operational risk disclosures. This focused approach has its advantages but also has its disadvantages, as the banking industry is only one sector of our economy and the information content is not broad enough. Future research may use a similar

methodology to that adopted in the current research to test other industries, or to test different kinds of information disclosures.

Due to the tedious and time-consuming work involved in composing the indices (VaRDI and ORDI), the research sample only includes sixty world's top banks as ranked by asset size in 2013. Future research may enlarge the sample size by including more banks around the world.

Due to the fact that the annual reports in electronical version are mostly available from 1996 onwards, the research sample period has only covered the past two decades. On the other hand, the modern banking industry has existed for more than a century. Whether the findings in the current research are still applicable for other periods in the banking industry are worth investigating further.

The research period of the past two decades is a period of turmoil for our economy, as the 2008 financial crisis has greatly shaken the global economy. Although this research has taken the impact of the financial crisis into account, it could not rule out the possibility that the severe financial crisis has still affected the empirical results in certain aspects. As suggested by Calomiris and Nissim (2014), the business environment has changed dramatically in the past decade. The banking industry especially has experienced combined changes of economic circumstances (e.g., low-interest rate; mergence within the banking industry) and regulatory policies. Together, these changes in the economic environment have affected the investors' relationship with the banking industry. The market perceptions when valuing banks to certain issues have also changed. For example, prior to the financial crisis, higher leverage was associated with greater value, but during and after the crisis, as default risk and regulatory concerns came to the fore, lower leverage turns out to be associated with

greater value. Therefore, future research may retest the findings of the current research in different periods without any impact of the financial crisis.

7.4 Final Remarks

Through this research, we have investigated the disclosure status of risk information in the banking industry and the disclosure impacts on market valuation and stock return volatility. Although, both the event study and the regression analysis have triggered doubts about the beneficial impact on market valuation by increased information disclosures, alongside the concerns of privacy and cost when disclosing information suggested by previous research, this research still firmly believes that the potential benefits of information disclosure would outweigh the disadvantages of information disclosure particularly considering the overall stability and safety of our economy. Maybe the statement by Faust and Svensson (2001) can be applied here that increased information disclosure in the banking industry is generally and socially beneficial but frequently bad for banks.

As the evidence suggests that increased information disclosure would mitigate market volatility, this research strongly encourages the banking industry to maintain a higher level of information transparency. Meanwhile, policymakers may think about and reformulate relevant policies in order to make information disclosure more efficiently in prohibiting the systemic risk and also protecting the interest of individual banks.

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